



# PROGRESS REPORT ON THE IMPLEMENTATION OF THE FEDERAL STEM EDUCATION STRATEGIC PLAN

*A Report by the*  
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

December 2021

## **About the National Science and Technology Council**

The National Science and Technology Council (NSTC) is the principal means by which the Executive Branch coordinates science and technology policy across the diverse entities that make up the Federal research and development enterprise. A primary objective of the NSTC is to ensure science and technology policy decisions and programs are consistent with the President's stated goals. The NSTC prepares research and development strategies that are coordinated across Federal agencies aimed at accomplishing multiple national goals. The work of the NSTC is organized under committees that oversee subcommittees and working groups focused on different aspects of science and technology. More information is available at <http://www.whitehouse.gov/ostp/nstc>.

## **About the Office of Science and Technology Policy**

The Office of Science and Technology Policy (OSTP) was established by the National Science and Technology Policy, Organization, and Priorities Act of 1976 to provide the President and others within the Executive Office of the President with advice on the scientific, engineering, and technological aspects of the economy, national security, homeland security, health, foreign relations, the environment, and the technological recovery and use of resources, among other topics. OSTP leads interagency science and technology policy coordination efforts, assists the Office of Management and Budget with an annual review and analysis of Federal research and development in budgets, and serves as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government. More information is available at <http://www.whitehouse.gov/ostp>.

## **About the Committee on STEM Education**

The Committee on STEM Education (CoSTEM) was established pursuant to the requirements of Section 101 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. §6621). In accordance with the Act, the Committee reviews science, technology, engineering, and mathematics (STEM) education programs, investments, and activities, and the respective assessments of each, in Federal agencies to ensure that they are effective; coordinates, with the Office of Management and Budget, STEM education programs, investments, and activities throughout the Federal agencies; and develops and implements through the participating agencies a STEM education strategic plan, to be updated every five years. The Federal Coordination in STEM Education (FC-STEM) is a subcommittee of the NSTC Committee on STEM Education (CoSTEM). FC-STEM advises and assists CoSTEM and serves as a forum to facilitate the formulation and implementation of the strategic plan.

## **About this Document**

The intent of this progress report is to provide Congress and the wider STEM education stakeholder community an update on the Federal activities that occurred from June 2020 to February 2021. This progress report includes: a summary of FC-STEM progress on the implementation of the STEM strategy, a description of the ways Federal agencies will work together to address common challenges, and an inventory of Federal STEM education programs. The annual report includes actual investments for FY2020, estimated investments for FY2021, and requested funding levels for FY2022 .

## **Copyright Information**

This document is a work of the United States Government and is in the public domain (see 17 U.S.C. §105). Subject to the stipulations below, it may be distributed and copied with acknowledgment to OSTP. Copyrights to graphics included in this document are reserved by the original copyright holders or their assignees and are used here under the Government’s license and by permission. Requests to use any images must be made to the provider identified in the image credits or to OSTP if no provider is identified. Published in the United States of America, 2021.

## NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

### *Chair*

**Eric Lander**, Director, OSTP

### *Executive Director*

**Kei Koizumi**, Acting Executive Director

## COMMITTEE ON STEM EDUCATION

### *Co-Chairs*

**Alondra Nelson**, Deputy Director, OSTP

**Sethuraman Panchanathan**, Director, NSF

## SUBCOMMITTEE ON FEDERAL COORDINATION IN STEM EDUCATION

### *Co-Chairs*

**Nafeesa Owens**, Assistant Director for STEM Education, OSTP

**Mike Kincaid**, Associate Administrator for STEM Engagement, NASA

**Sylvia Butterfield**, Acting Assistant Director for Education and Human Resources, NSF

### *Executive Secretary*

**Susan Poland**, NASA

### *Senior Advisor*

**Quincy Brown**, OSTP

### *Members*

**Melissa Anley-Mills**, EPA

**Charmain Bogue**, VA

**Julie Carruthers**, DOE

**Catherine Derbes**, OMB

**Robert Hampshire**, DOT

**Kourtney Hollingsworth**, USDA

**Diane M. Janosek**, NSA

**Louisa Koch**, DOC/NOAA

**Kay Lund**, HHS/NIH

**Cheryl Martin**, DOL

**Carol O'Donnell**, SI

**Albert Palacios**, ED

**Jagadeesh Pamulapati**, DoD

**Jeanita Pritchett**, DOC/NIST

**Craig Robinson**, DOI/USGS

**Gregory Simmons**, DHS

**Jorge Valdes**, DOC/USPTO

**Leslie Wheelock**, HHS/FDA

## Table of Contents

<b>INTRODUCTION .....</b>	<b>1</b>
FIVE-YEAR FEDERAL STEM EDUCATION STRATEGIC PLAN .....	1
<b>FEDERAL IMPLEMENTATION EFFORTS: JUNE 2020 TO FEBRUARY 2021 .....</b>	<b>3</b>
INTERAGENCY WORKING GROUPS (IWGs).....	3
<i>Develop and Enrich Strategic Partnerships (Strategic Partnerships IWG)</i> .....	4
<i>Engage Students where Disciplines Converge (Convergence IWG)</i> .....	5
<i>Build Computational Literacy (Computational Literacy IWG)</i> .....	6
<i>Operate with Transparency and Accountability (Transparency and Accountability IWG)</i> .....	7
<i>Diversity, Equity, and Inclusion in STEM (IWG on Inclusion in STEM)</i> .....	8
<i>Veterans and Military Spouses in STEM (IWG on Veterans and Military Spouses in STEM)</i> .....	9
<b>EFFORTS OUTSIDE OF THE INTERAGENCY WORKING GROUPS .....</b>	<b>10</b>
PUBLIC ENGAGEMENT .....	10
OUTREACH AND DISSEMINATION EFFORTS.....	10
PUBLIC-PRIVATE PARTNERSHIPS.....	12
STEM EDUCATION ADVISORY PANEL.....	13
<b>CLOSING SUMMARY.....</b>	<b>13</b>
<b>APPENDIX 1. AGENCY STEM EDUCATION IMPLEMENTATION ACTIONS ALIGNMENT TOPATHWAYS AND OBJECTIVES (VERSION: 12.04.2018) .....</b>	<b>14</b>
<b>APPENDIX 2. DEFINITION OF A STEM EDUCATION INVESTMENT .....</b>	<b>15</b>
<b>APPENDIX 3. AGENCY STEM EDUCATION INVESTMENTS (FY2020) ALIGNMENT TO GOALS AND PATHWAYS ...</b>	<b>17</b>
<b>APPENDIX 4. PROFILE OF FY2020 STEM EDUCATION INVESTMENTS.....</b>	<b>30</b>
<b>APPENDIX 5. FY 2021-ENACTED INVENTORY OF STEM EDUCATION INVESTMENTS .....</b>	<b>34</b>
<b>APPENDIX 6: SUMMARY OF STEM EDUCATION INVESTMENTS .....</b>	<b>49</b>

## Abbreviations and Acronyms

<b>AFRL</b>	Air Force Research Laboratory	<b>EERE</b>	DOE Office of Energy Efficiency and Renewable Energy
<b>APHIS</b>	USDA Animal and Plant Health Inspection Service	<b>EHR</b>	NSF Directorate for Education and Human Resources
<b>CCLC</b>	21 <sup>st</sup> Century Community Learning Centers Program	<b>EM</b>	DOE Office of Environmental Management
<b>CISE</b>	NSF Directorate for Computing and Information Science and Engineering	<b>ENG</b>	NSF Directorate for Engineering
<b>CNCS</b>	Corporation for National Community Service	<b>EPA</b>	U.S. Environmental Protection Agency
<b>COE</b>	FAA Air Transportation Center of Excellence	<b>ETA</b>	DOL Employment and Training Administration
<b>CoSTEM</b>	Committee on STEM Education	<b>FAA</b>	DOT Federal Aviation Administration
<b>CWMD</b>	DHS Countering Weapons of Mass Destruction	<b>FC-STEM</b>	Federal Coordination in STEM Education Subcommittee
<b>DHS</b>	Department of Homeland Security	<b>FDA</b>	Food and Drug Administration
<b>DOC</b>	Department of Commerce	<b>FE</b>	DOE Office of Fossil Energy
<b>DOD</b>	Department of Defense	<b>FEMP</b>	DOE Federal Energy Management Program
<b>DOE</b>	Department of Energy	<b>FHWA</b>	DOT Federal Highway Administration
<b>DOE/ED</b>	DOE Office of Economic Impact and Diversity	<b>HBCU-UP</b>	NSF Historically Black Colleges and Universities – Undergraduate Program
<b>DOI</b>	Department of the Interior	<b>HHS</b>	Department of Health and Human Services
<b>DOL</b>	Department of Labor	<b>HRSA</b>	HHS Health Resources & Services Administration
<b>DOS</b>	Department of State	<b>HUD</b>	Department of Housing and Urban Development
<b>DOT</b>	Department of Transportation	<b>IES</b>	ED Institute of Education Sciences
<b>DSEC</b>	Defense Science Technology Engineering and Mathematics Education Consortium	<b>IMLS</b>	Institute of Museum and Library Services
<b>DTRA</b>	DOD Defense Threat Reduction Agency	<b>IT</b>	Information Technology
<b>EASE</b>	NSF Excellence Awards in Science and Engineering	<b>IWG</b>	Interagency Working Group
<b>ECR</b>	NSF EHR Core Research	<b>IWGIS</b>	Interagency Working Group on Inclusion in STEM
<b>ED</b>	Department of Education	<b>MDA</b>	DOD Missile Defense Agency
<b>EDA</b>	DOC Economic Development Administration	<b>MPS</b>	NSF Directorate for Mathematical and Physical Sciences
<b>EDMAP</b>	USGS Educational Mapping Program	<b>MSI</b>	Minority Serving Institution
<b>EE</b>	EPA Office of Environmental Education	<b>MUREP</b>	NASA Minority University Research and Education Project

<b>NASA</b>	National Aeronautics and Space Administration	<b>OSTP</b>	Office of Science and Technology Policy
<b>NCEAI</b>	National Council for Expanding American Innovation	<b>OUSDRE</b>	Office of the Under Secretary of Defense for Research and Engineering
<b>NE</b>	DOE Office of Nuclear Energy	<b>P&amp;R/M&amp;RA</b>	DOD Personnel & Readiness/ Manpower & Reserve Affairs
<b>NIFA</b>	USDA National Institute of Food and Agriculture	<b>PAEMST</b>	Presidential Awards for Excellence in Mathematics and Science Teaching
<b>NIH</b>	National Institutes of Health	<b>PAESMEM</b>	Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring
<b>NIHF</b>	National Inventors Hall of Fame	<b>PPP</b>	Public-private partnerships
<b>NIST</b>	National Institute of Standards and Technology	<b>R&amp;D</b>	Research and development
<b>NNSA</b>	DOE National Nuclear Security Administration	<b>RES</b>	NRC Office of Nuclear Regulatory Research
<b>NOAA</b>	National Oceanic and Atmospheric Administration	<b>RFI</b>	Request for Information
<b>NPS</b>	National Park Service	<b>S&amp;T</b>	Science and Technology
<b>NRC</b>	Nuclear Regulatory Commission	<b>SBCR</b>	NRC Small Business and Civil Rights Office
<b>NSF</b>	National Science Foundation	<b>SBIR</b>	Small Business Innovation Research Program
<b>NSF INCLUDES</b>	NSF program on Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science	<b>SC</b>	DOE Office of Science
<b>NSTC</b>	National Science and Technology Council	<b>SI</b>	Smithsonian Institution
<b>ODASART</b>	Office of the Deputy Assistant Secretary of the Army for Research & Technology	<b>SMD</b>	NASA Science Mission Directorate
<b>OESE</b>	ED Office of Elementary and Secondary Education	<b>STEM</b>	Science, technology, engineering, and mathematics
<b>OIA</b>	NSF Office of Integrative Activities	<b>STTR</b>	Small Business Technology Transfer Program
<b>OISE</b>	NSF Office of International Science and Engineering	<b>TA IWG</b>	Transparency and Accountability IWG
<b>OMB</b>	Office of Management and Budget	<b>TCU</b>	Tribal College and University
<b>ONR</b>	DOD Office of Naval Research	<b>TCUP</b>	NSF Tribal Colleges and Universities Program
<b>OPE</b>	ED Office of Postsecondary Education	<b>U.S.</b>	United States
<b>ORD</b>	EPA Office of Research and Development	<b>USDA</b>	United States Department of Agriculture
		<b>USGS</b>	United States Geological Survey
		<b>USPTO</b>	United States Patent and Trademark Office
		<b>VA</b>	Department of Veterans Affairs

## Introduction

Science, technology, engineering, and mathematics (STEM) are the foundation for discovery and technological innovation. STEM skills are increasingly important for all Americans to succeed in the workplace and in their everyday lives. To develop these skills, the Nation must engage in a collaborative effort to ensure that all Americans have access to high-quality STEM education throughout their lifetimes. A focus on diversity and inclusion in STEM requires attention to opportunities across education and career pathways. This effort is especially important for those who are historically underrepresented and underserved in STEM. A well-prepared and diverse STEM workforce is essential to maintaining global leadership as it galvanizes the ingenuity of Americans to accelerate tomorrow's breakthroughs and strengthens our economic and national security.

In December 2018, the National Science and Technology Council (NSTC) Committee on STEM Education (CoSTEM) released *Charting a Course for Success: America's Strategy for STEM Education*<sup>1</sup>, a five-year STEM education strategic plan, hereafter referred to as the Strategic Plan.

Federal agencies engaged in STEM education are implementing the Strategic Plan, under the guidance of CoSTEM and its Federal Coordination in STEM Education (FC-STEM) Subcommittee. This progress report describes ongoing efforts and implementation practices across the Federal government as it works to accomplish the goals and objectives of the Strategic Plan. This report also compiles budget information from all Federal agencies that have investments in STEM education during Fiscal Year (FY) 2021.

Additionally, this document fulfills the America COMPETES Reauthorization Act of 2010 requirement that the Office of Science and Technology Policy (OSTP) transmit a report annually to Congress that provides an update on the performance of the Federal STEM education portfolio and an inventory of Federal STEM education investments.

### Five-Year Federal STEM Education Strategic Plan

The Strategic Plan presents a vision for a future in which all Americans will have lifelong access to high-quality STEM education and the United States will remain the global leader in STEM literacy, innovation, and employment.

The Strategic Plan focuses on three overarching goals<sup>2</sup>:

**Build Strong Foundations for STEM Literacy** by ensuring that every American has the opportunity to master basic STEM concepts and to become digitally literate.

**Increase Diversity, Equity, and Inclusion in STEM** by providing all Americans with lifelong access to high-quality STEM education, especially those historically underrepresented and underserved in STEM fields and employment.

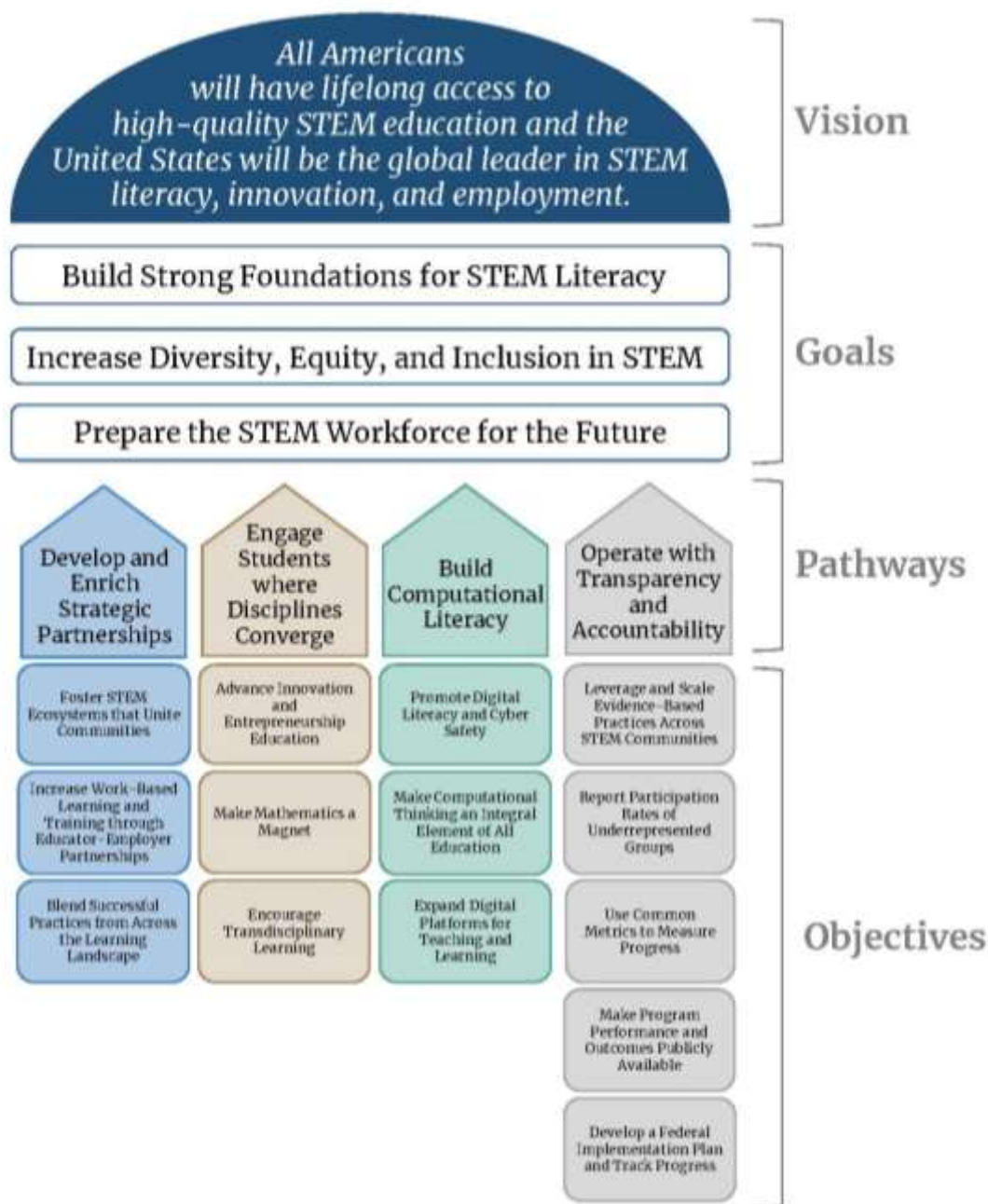
**Prepare the STEM Workforce for the Future** by creating authentic learning experiences—for both college-educated STEM practitioners and those working in skilled trades that do not require a four-year degree—that encourage and prepare learners to pursue STEM careers.

---

<sup>1</sup> [Charting a Course for Success: America's Strategy for STEM Education \(archives.gov\)](https://www.archives.gov/education/programs/stem/charting-a-course-for-success-america-s-strategy-for-stem-education)

<sup>2</sup> Overarching goals updated slightly in 2021





**Figure 1.** Schematic illustrating the organizational structure of the Federal STEM Education Strategic Plan released in December 2018. The Strategic Plan’s vision is supported by three aspirational goals. Four pathways contain objectives to guide efforts by the Federal government and the wider STEM education community to realize the Strategic Plan’s vision and goals.

The Strategic Plan is further organized around four pathways, representing a cross-cutting set of approaches to improve STEM education that will help fulfill its vision and achieve its three goals:

**Develop and Enrich Strategic Partnerships** – Strengthen relationships between educational institutions, industry, and community organizations to leverage resources for the purpose of providing the student with meaningful learning opportunities.

**Engage Students where Disciplines Converge** – Draw on knowledge and methods across disciplines to solve complex, real-world problems in STEM using innovation, creativity, and initiative.

**Build Computational Literacy** – Design integrated approaches to teaching and learning computational thinking and promote the expansion of digital platform use.

**Operate with Transparency and Accountability** – Develop and apply metrics that assess implementation progress in meaningful ways.

### Federal Implementation Efforts: June 2020 to February 2021

CoSTEM is the highest-level interagency body in the Federal government devoted to STEM education. It oversees coordination of STEM education programs across government and, every five years, creates a strategic plan. The Federal Coordination in STEM Education Subcommittee (FC-STEM) oversees the implementation of the Federal STEM Education Strategic Plan and advises CoSTEM and the OSTP Director on the development and progress of the collaborative work in STEM education across the Federal science agencies.

In FY 2019, CoSTEM developed an implementation structure (four interconnected interagency working groups) to support work toward the goals and objectives of the Strategic Plan. The IWGs are organized by the Strategic Plan's four pathways. A fifth IWG, the Interagency Working Group on Inclusion in STEM (IWGIS), was chartered by the NSTC in response to Section 308 of the American Innovation and Competitiveness Act<sup>3</sup>. A sixth IWG was formed in 2020 in response to the Supporting Veterans in STEM Careers Act<sup>4</sup>. FC-STEM facilitates the work of all six IWGs.

The interagency collaboration of FC-STEM empowers agencies to improve STEM education by sharing best practices, leveraging the expertise and resources of Federal partners, and coordinating activities in support of common educational goals. FC-STEM agencies are also working together to maximize the impact of their efforts within the broader STEM education community.

### Interagency Working Groups (IWGs)

This report captures activities carried out by the IWGs from June 2020 to February 2021. Four of the IWGs— Computational Literacy, Convergence, Strategic Partnerships, and Transparency & Accountability— concentrate their efforts on one of each of the four pathways outlined in the Strategic Plan. A fifth IWG, the Interagency Working Group on Inclusion in STEM (IWGIS) supports the goal of increasing diversity, equity and inclusion in STEM. The sixth IWG on Veterans and Military Spouses in STEM, supports the representation and equity of veterans and military spouses in STEM fields and careers.

---

<sup>3</sup> [S.3084 - 114th Congress \(2015-2016\): American Innovation and Competitiveness Act | Congress.gov | Library of Congress](#)

<sup>4</sup> [S.153 - 116th Congress \(2019-2020\): Supporting Veterans in STEM Careers Act | Congress.gov | Library of Congress](#)

The six interagency working groups coordinate to ensure they produce complementary efforts that further the goals and objectives of the Strategic Plan. The sections that follow provide an overview of the foci for each IWG, highlight some of the actions that agencies are taking that support the work of the IWG, and provide an overview of the work that the IWGs have prioritized to pursue collaboratively.

### ***Develop and Enrich Strategic Partnerships (Strategic Partnerships IWG)***

*Participating Agencies: DOC, DOD, DOE, DHS, DOI, ED, NASA, NSF, OSTP, and SI*

**Description:** Partnerships among Federal agencies, educational institutions, employers, museums, and other community organizations leverage resources and expertise across STEM education ecosystems to maximize the impact of educational efforts. These connections broaden and enhance the education of today's learners by providing authentic STEM experiences, seamless career and educational transitions, and opportunities for diverse mentorship.

**Investment:** From the Federal STEM Inventory, 129 programs with a total FY 2020 investment of \$2.25 billion directly or indirectly supported the Strategic Partnerships Pathway under the Federal STEM Education Strategic Plan. These investments are found in CNCS, DHS, DOC, DOD, DOE, DOL, DOT, ED, EPA, HHS, NASA, NSF, SI, USDA, and VA.

#### **Actions Taken Toward Implementation:**

To advance strategic partnership objectives, the Strategic Partnerships IWG engaged with stakeholders internal and external to the Federal government through a series of data calls and Requests for Information (RFIs), to learn and encourage adoption of partnership and ecosystem<sup>5</sup> approaches. Through these efforts, the IWG learned of over 100 new or updated partnerships amongst the Federal agencies in FY 2020.

The IWG included questions on a FC-STEM data call to learn about agencies' anticipated use of the IWG's STEM education ecosystem definition, finalized in FY 2019, and agencies' current use of work-based learning (WBL) models. Twelve agencies reported that they plan to use the STEM education ecosystem definition in the next 2 years, and 82 FY 2020 WBL programs were reported. The majority of these WBL programs support undergraduate and graduate students, but high school, teacher and veterans' programs were also identified.

The IWG also contributed questions to a public RFI led by FC-STEM. Analysis of the responses led to important insights around the direction of the IWG's future work. The responses to questions related to STEM education ecosystems highlighted the need for more information on consistent measures, structures, and membership. Employers and industry were cited as key partners, emphasizing the importance of work-relevant partners. The responses to questions related to work-based learning revealed models of and barriers to work-based learning that the IWG had not previously considered, especially for high school programs.

---

<sup>5</sup> Federal definition for STEM Education Ecosystems: STEM education ecosystems consist of multi-sector partners united by a collective vision of supporting participation in STEM through the creation of accessible, inclusive STEM learning opportunities spanning all education stages and career pathways. A STEM education ecosystem continuously evaluates its activities and adapts as needed, plans for the long-term, and communicates its work to build broad support and advance best-practices. ([2020 Progress Report on the Implementation of the Federal STEM Education Strategic Plan \(archives.gov\)](https://www.archives.gov/education/2020-progress-report-on-the-implementation-of-the-federal-stem-education-strategic-plan))

The IWG enhanced public knowledge of Federal internship opportunities and promoted the formation of new partnerships through two public webinars. These webinars were conducted in partnership with the NSF INCLUDES National Network, thereby tapping into an existing STEM education ecosystem.

Finally, the IWG defined standards for robust WBL programs and completed an initial assessment of models for expanding opportunities across agencies. This included programs that provide WBL in Federal contracts and private sector awards.

### ***Engage Students where Disciplines Converge (Convergence IWG)***

*Participating Agencies: DOC, DOD, DOE, ED, NASA, NSF, OSTP, and SI*

**Description:** When incorporated into STEM teaching, learning, and assessment, real world STEM challenges engage students by drawing on knowledge and methods from across disciplines by promoting initiative and creativity. To encourage transdisciplinary learning, the IWG established a plan to review existing efforts to: (1) support STEM educators and students through upskilling, resourcing, and providing a forum to share best practices; (2) support the dissemination of effective transdisciplinary STEM education practices and programs to attract a more diverse and inclusive community of participants; and (3) expand support for STEM learners to study transdisciplinary problems through internships, fellowships, scholarships, and other experiential learning opportunities.

**Investment:** From the Federal STEM Inventory, 128 programs with a total FY 2020 investment of \$2.67 billion directly or indirectly supported the Convergence Pathway under the Federal STEM Education Strategic Plan. These investments are found in CNCS, DHS, DOC, DOD, DOE, DOI, DOT, ED, EPA, HHS, NASA, NSF, SI, USDA, and VA.

#### **Actions Taken Toward Implementation:**

The Convergence IWG conducted a substantive literature review on convergence education in the K-20 space towards the development of a convergence education definition. This literature review also established a basis of reference for further understanding transdisciplinary (TD) learning in STEM education.

Research suggests that, while much work has been done to promote and advance convergence education over the past decade, a distinct and common framework is beneficial to the concept of convergence being adopted and universally recognized. Therefore, the Convergence IWG efforts were subsequently centered around developing, refining, and promoting a flexible and adaptable “Pathways to Convergence” framework that can be leveraged by educators, stakeholders, and federal agencies. While still under development, the framework will emphasize the need for input from both Federal agencies and external stakeholders and is designed to be iterative and to evolve over time.

The IWG also hosted a series of educator roundtables which helped establish a preliminary understanding of “convergence,” “transdisciplinary learning and teaching,” and “integrated STEM,” and how they are communicated, leveraged, and understood in various educator spaces. These initial conversations with educators across the K-20 spectrum offered a preview of information to be collected more broadly in the public RFI. Together, information from the educator roundtables and public RFI contributed to the realization of the challenges and feasibility in implementing evidence-based convergence education.

Solicitations for model programs and best practices in TD learning and education from Federal agencies brought to light programs that are exemplary. Most Federal agencies indicated that work-based experiences are an area where TD programming is most feasible.

### ***Build Computational Literacy (Computational Literacy IWG)***

Participating Agencies: DOC, DOD, ED, NITRD, NSF, OSTP, SI, and USDA

**Description:** Federal agencies are well-positioned to help Americans of all ages and backgrounds harness the benefits of digital technology and be critical and ethical participants in the digital economy. By developing integrated approaches to teaching and learning computational thinking and supporting new digital technology-based learning environments, agencies can advance mission-critical goals like promoting cyber safety and encouraging responsible data management. In addition, Federal agencies are creating internships and job opportunities for students with computational skills. For example, NOAA hired more than 75 students with strong computational skills through the Pathways program.

**Investment:** From the Federal STEM Inventory, 119 programs with a total FY 2020 investment of \$2.32 billion directly or indirectly supported the Computational Literacy Pathway under the Federal STEM Education Strategic Plan. These investments are found in CNCS, DHS, DOC, DOD, DOE, DOI, DOL, DOT, ED, EPA, HHS, NASA, NSF, SI, USDA, and VA.

#### **Actions Taken Toward Implementation:**

The Computational Literacy IWG continued to execute towards its objectives that encourage the use of a common definition of computational literacy, support dissemination of promising content and practices that promote computational literacy and expand digital platform use. The CL IWG utilized the FC-STEM Request for Information (RFI) to advance efforts across its core objectives, including four questions specific to the CL IWG, for which there were more than 100 respondents. In reviewing the full set of responses, there were many other inputs relevant to CL activities. The CL IWG is using the RFI responses as input to its Federal agency definition of computational literacy. The definition will help provide a means for common metrics and clarity to enable accurate reporting of Federal Agency actions.

The IWG also developed strategic objectives for measuring progress, including developing consensus among Federal agencies on an operational definition of computational literacy; curating and disseminating fundamental and applied research on promising content and practices to promote computational literacy and effective uses of digital platforms, tools, and methods for teaching computational literacy; and expand research on and support for development of curricula using digital tools and universal design principles.

FC-STEM agencies also worked alongside the country's education community to promote digital literacy and cyber safety. In November 2020, NSF released a call for proposals to its Data Science Corps program with plans to award up to \$12 million dollars. The program promotes data literacy and provides training in data science to the existing workforce. NIH is preparing the next generation of researchers by incorporating computational skills and the principles of responsible data use into all of its programs for undergraduate and graduate students. ED held several webinars that align with the CL objectives to include integrating emerging technologies into teaching practice and online and hybrid teaching. ED, in collaboration with NSF and the National Security Council, opened nominations for the second annual Presidential Cybersecurity Education Award. The DOC National Initiative for

Cybersecurity Education Program, led by NIST, included a focus on digital citizenship, digital literacy, and CL in its new National Strategic Plan to build the nation's cybersecurity workforce. Across the Department, DoD supported a number of CL related programs and activities for K-12, undergraduate and graduate students. DOD continued to collaborate with DHS and others to promote and facilitate cyber education for teachers and students of military families.

### ***Operate with Transparency and Accountability (Transparency and Accountability IWG)***

*Participating Agencies: DOC, DOD, DOE, ED, HHS, NASA, NSF, OMB, OSTP, and USDA*

**Description:** Across the Federal STEM education enterprise, agencies are working to: develop and apply metrics that assess progress in meaningful ways; identify and scale evidence-based practices; collect data on educational programs, such as performance evaluations, program outcomes, and participation rates for underrepresented groups; and disseminate information to external stakeholders. The complexity of Federal investments in STEM education dictates the multiplicity of approaches that are being pursued to implement the Strategic Plan, and it is an essential consideration for the interagency development of metrics, operational definitions of terms, and best practices. This complexity requires creative and flexible approaches that focus on key points of intersection between programs to help establish and enhance returns on these investments. Developing common metrics may also require consideration of available resources with the understanding that budgets vary widely across the inventory of Federal STEM education programs.

#### **Actions Taken Toward Implementation:**

The America COMPETES Reauthorization Act of 2010 calls on CoSTEM to document “rates of participation by women, underrepresented minorities, and persons in rural areas” in its federally sponsored STEM education programs and activities. To help agencies with this reporting requirement, the Transparency and Accountability Interagency Working Group (T&A IWG) developed a set of guidelines for defining “participants” and for designating persons in rural areas. In order to determine the feasibility and utility of the recommended participant reporting guidelines, the T&A IWG conducted a pilot with a small number of FC-STEM agency investments using a survey instrument. The goals of the pilot were to: (1) test and, if necessary, refine guidelines for agency-level decisions regarding participation rate reporting; and (2) provide FC-STEM with information on factors that may impede or support the adoption of the guidelines.

Investments across agencies were nominated for inclusion in the pilot and 19 investments across 10 agencies were selected for inclusion in the pilot. The 19 investments were selected to represent a range of STEM programs and activities supported by FC-STEM agencies, including small to large budget investments, different population targets (e.g., students, teachers, institutions), and different focus areas (e.g., training, scholarships, informal learning, K-12, postsecondary). Agency program representatives were asked to provide: (1) an overview of the program/activity/investment; (2) feedback on proposed participant guidelines; (3) feedback on proposed guidelines for designating “persons in rural areas”, and (4) participant data.

Based on the survey responses, the T&A IWG concluded it was not necessary to refine its original recommendations or proposed guidelines for participant reporting. Accordingly, some of the T&A IWG recommendations continue to be that: participants be classified into specified “participant types” for reporting purposes; “rural areas” be defined using OMB’s Core-based Statistical Areas (CBSA); agencies



internally collect and organize their geographic data by zip code, or alternatively by county or by street address (bearing in mind that agencies using zip code or street address as geographic identifiers will need to be able to translate that raw data into county data and the CBSA designation in their data systems); and FC-STEM adopt the recommended guidelines for agencies' use in determining the STEM education programs and activities subject to participant reporting.

### ***Diversity, Equity, and Inclusion in STEM (IWG on Inclusion in STEM)***

*Participating Agencies: DOC, DOD, DOE, DHS, DOI, DOS, DOT, ED, EPA, HHS, NSF, NASA, OSTP, SI, and USDA*

**Description:** Increasing diversity, equity, and inclusion in STEM is one of the Strategic Plan's three central goals. When an organization's workforce is diverse in terms of gender, race, socioeconomic status, ethnicity, physical ability, geography, etc., and provides an inclusive environment that values diversity and promotes equitable opportunities, the organization better retains talent and is more innovative and productive. Increasing equity and inclusion are fundamental prerequisites for making high-quality STEM education accessible to all Americans and will maximize the creative capacity of tomorrow's workforce.

**Investment:** From the Federal STEM Inventory, 165 programs with a total FY 2020 investment of \$3.33 billion directly or indirectly supporting the Diversity, Equity and Inclusion Goal under the Federal STEM Education Strategic Plan. These investments are found in CNCS, DHS, DOC, DOD, DOE, DOL, DOT, ED, EPA, HHS, NASA, NRC, NSF, SI, USDA, and VA.

#### **Actions Taken Toward Implementation:**

Efforts toward inclusion in STEM across FC-STEM agencies are coordinated by the IWGIS. For this reporting period, IWGIS carried out work in three priority areas.

First, the IWGIS worked to develop and share a resource for outlining best practices for diversity and inclusion across Federal agencies. Following up on work defining best practices, promising practices, emerging practices, underserved, and underrepresented, IWGIS completed a literature search for best practices in diversity and inclusion and compiled information from an FC-STEM data call highlighting successful practices in federal agencies. The committee organized the findings and completed a draft of the best practices report by February 2021.

Second, the IWGIS is charged with working collaboratively with the other IWGs as they work toward their goals. IWGIS and TA IWG formed a joint committee to work on a literature review on barriers to inclusion in STEM and common metrics for Federal STEM programs. The review on barriers to inclusion in STEM is being reviewed and will be an addition to a summary document of best practices in inclusion in STEM document. IWGIS and SP IWG are working jointly on internship, fellowship, and other work-based learning programs. This joint committee's ongoing work will support best practices that eliminate barriers for inclusion in work-based learning programs, including those in the application process and on-site harassment.

Third, one of the IWG's overarching goals is to increase the diversity of the Federal STEM workforce. Toward that goal, the IWG completed an analysis of the diversity of the current Federal STEM workforce using 2019 FedScope data. This will be the baseline for progress measured under this plan.

The IWGIS also worked with the Hiring Authorities Tiger Team to propose new hiring authorities that target diversity. Recommendations were presented to FC-STEM in fall 2020.

### ***Veterans and Military Spouses in STEM (IWG on Veterans and Military Spouses in STEM)***

*Participating Agencies: DOD, ED, EPA, NSF, NASA, OSTP, OMB, and VA*

**Description:** Develop and implement a plan to better enable military spouses and veterans to be fully engaged in a mobile, highly technical, and malleable STEM workforce designed to advance our Nation's global leadership and economic development by increasing the representation and equity of veterans and military spouses in STEM occupations and careers through targeted government programs that support access to STEM educational pathways and the development of skillsets portable across geographic regions.

#### **Actions Taken Toward Implementation:**

In February 2020, the Supporting Veterans in STEM Careers Act was signed, seeking to improve representation and equity of veterans and military spouses in STEM fields. The Act directed OSTP to develop and facilitate the development and implementation of a strategic plan to support veterans, service members, and military spouses in STEM education and careers by establishing an Interagency Working Group (IWG) to coordinate efforts across the Federal government.

The *Supporting Veterans in STEM Careers Act* specifies that the strategic plan should: Identify barriers veterans face in reentering the workforce; Identify barriers military spouses face in establishing careers in STEM fields; Specify short- and long-term objectives; Describe the approaches that each participating agency will take; Specify common metrics that will be used by Federal agencies to measure progress toward objectives; and Identify barriers requiring Federal or State legislative or regulatory changes.

A multi-agency working group was formed meeting almost monthly to create a new strategic plan. The IWG intends for their work to address points of intersection between STEM education and barriers to growing the domestic STEM workforce, as well as changing conditions that could positively influence the employment of veterans and military spouses. The strategy should aim to identify overarching goals and specific actions the Federal government can take to help address barriers that Veterans, transitioning service members, and military spouses experience pursuing STEM education and careers, and to propose workforce investments that fuel expansion of science and engineering to maintain global leadership in research and development. The report should be released in 2021.



## Efforts Outside of the Interagency Working Groups

### Public Engagement

On August 3, 2020, the Excellence Awards in Science and Engineering (EASE) program honored 107 recipients with the Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) and 15 recipients with the Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM). NSF manages the EASE program on behalf of OSTP. The COVID-19 pandemic did not allow for a face-to-face recognition event, which limited agency interaction with the awardees. Federal science agencies from across government taped short videos congratulating the awardees, which were combined to create a video montage of agency representatives speaking to the awardees.

In September 2020, OSTP and NSF, on behalf of CoSTEM, released a public RFI containing 24 questions related to the Federal STEM Education Strategic Plan and changes in education systems that have been impacted by the COVID-19 pandemic. One hundred fifteen total responses were submitted and included responses from teachers, university faculty and administrators, state governments, and non-profit organizations, among others. While the individual responses varied, there were several overarching themes including: The digital divide became very apparent and important in a post-COVID education and that digital divide includes access to Internet, technology, and technological support; Student engagement is a huge, unresolved issue (present pre-COVID, exacerbated post-COVID); and There is a great deal of concern about how to mitigate these issues. In general, many responses also suggested the Federal government:

- **Boost STEM literacy initiatives:** Increased introductory and applied computational and data science training is needed for undergraduate and graduate level students to boost STEM literacy.
- **Increase funding for STEM Education:** Federal investment in STEM Education should support funding for apprenticeships and development programs, and should engage State and local governments.
- **Push to make STEM more inclusive:** Focused mentorship, bias training in hiring, and workforce cultural changes can improve representation of women and underrepresented racial and ethnic groups within the STEM workforce.
- **Broaden the definition of STEM:** To be inclusive of the behavioral and cognitive sciences.

In addition to individual and non-profit responses from across the United States, several State-level education offices submitted official responses to the RFI, including the Virginia STEM Education Commission, the Minnesota Department of Education, and the STEM unit of the Elementary and Secondary Education division of the Arkansas Department of Education. Among other information, states provided a list of future opportunities for improving the quality of STEM education, plans and activities for increasing computational literacy, and information on State-level activities in response to COVID-19 challenges as well as public private partnerships. The full RFI responses are available online<sup>6</sup>.

### Outreach and Dissemination Efforts

The COVID-19 Pandemic caused a myriad of challenges for the Nation. The STEM Education and Workforce community experienced shifts in the ways in which learning and working occurred in the recent year. Federal agencies also shifted - in the ways their STEM programs were offered and in some of the ways they engaged with the public. In 2020, nearly all of the Federal government entities shifted

---

<sup>6</sup> <https://www.nsf.gov/ehf/Materials/STEMEDRFIResponses.pdf>

their in-person programs to the virtual format. While at least ten programs were cancelled or postponed, most other programs were adapted for virtual delivery in 12 different ways, including virtual field trips, online labs, and virtual internships and mentoring.

The NOAA Office of Education Higher Education Programs transitioned their internships to a virtual format while their facilities were closed due to the pandemic. In particular, scholars from the Ernest F. Hollings Undergraduate Scholarship and José E. Serrano Educational Partnership Program with Minority Serving Institutions Undergraduate Scholars Program were able to conduct NOAA-mission research, network, and learn new skills while remaining safe. The 10-week summer program, originally planned as an in-person engagement, continued with 180 employees serving as mentors and research leads for the students.

The shift to virtual formats provided opportunities for Federal agencies to use virtual resources to reach a greater number of program participants with the removal of constraints such as room size and travel cost. Without access to the National Zoo, the Smithsonian Institute offered a webinar series, the Wild Side of STEAM, in 2020. The webinars are open to individuals and groups of all sizes which allows the Zoo to increase the scale of their engagement.

In addition to adapting their programs, agencies employed a variety of strategies to disseminate resources, programmatic updates, and communicate with the public. Common strategies included creating online downloadable materials, e.g. labs, and lesson plans, posting videos for online STEM teaching and learning, enabling students to deliver poster and oral presentations online, and information about STEM careers and educational pathways.

The use of websites was common to reach participants. The Department of Defense experienced a 97% increase in users, a 65% increase in page views and a 108% increase in the number of sessions for their DoD STEM website ([dodstem.us](http://dodstem.us)). The site is an online environment that provides visitors with information about DoD career and educational opportunities, resources for teachers, and DIY activities for adults and children. The site includes information and resources about topics ranging from health and medicine (e.g. DNS), science (e.g. electromagnetic waves), and technology (e.g. robotics).

The Environmental Protection Agency Community Engagement Program, Research Triangle Park (RTP) Speakers Bureau provides a way for more than 200 EPA RTP employees to communicate EPA science to the public including over 2,100 K-12 students and educators on the EPA's RTP campus as well as at local school, community, and national events. The shift to virtual engagements provided the EPA experts across the country an opportunity to continue participating in educational programming independent of location.

The NASA Kids Club website received over half-million page views in mid-March 2020 eventually experiencing a 316% increase compared to the prior month. As the pandemic continued, page views for FY2020 Q3 and Q4 experienced a 57% increase from their viewership in FY2019. By June 2020, nearly 300 media outlets had highlighted NASA STEM resources that were created and disseminated online. The increased attention yielded increased page views. For example, the NASA Science Mission Directorate's (SMD) "Get Involved" page experienced a 770% increase in page views, the NASA Citizen Science site experienced a 358% increase in page views, and SMD awardee WGBH experienced a 700% increase in downloadable materials. In total, 193 new products were added during FY2020 Q3 and Q4.

## **Public-Private Partnerships**

Partnerships between public and private entities provide opportunities to invest in and support STEM education programs and initiatives. Leveraging the best that each partner contributes allows for STEM education and workforce projects to be effective in supporting the Nation's current and future workforce. Federal agencies engage in individual partnerships that enable non-Federal resources to augment federal investments. Across the Federal government, agencies engaged in partnerships with entities most often with academic sector as well as those in the private sector, State or local governments, non-profit organizations and other Federal agencies.

In FY2020, nine agencies established new partnerships including DoD, DoT, EPA, NASA, ED, USPTO, NIH, VA, and SI. In support of on-going efforts, agencies including, DOD, DoT, EPA, NASA, NOAA, NSF, SI, and USPTO also renewed or expanded exiting partnerships in FY2020. To document the partnerships, a variety of mechanisms was used with MOU/MOAs, Grants, and Informal Agreements most commonly utilized.

The Department of Defense established the OnRamp II program in FY2020 using an educational partnership agreement with four institutions, North Carolina Agricultural & Technical State University, University of Maryland Baltimore County, University of Texas- San Antonio, and the Collaboration for Advancing Minority Participation in Security which includes Texas Agricultural & Mechanical University, Prairie View Agricultural & Mechanical University, Texas Agricultural & Mechanical State University-Corpus Christi, Texas Agricultural & Mechanical State University-San Antonio, and West Texas Agricultural & Mechanical State University. This partnership promotes the technical health of a diverse STEM pipeline for NSA and offers scholarships to students in return for internships, service with the NSA, and mission-focused research opportunities.

The Rural Tech Project, a \$600,000 challenge to advance technology education in rural high schools was started in FY2020. Recognizing that today's high school students need advanced technology skills and that one-third of American schools are in rural areas, the Department of Education has established this challenge and will provide rural schools with opportunities to design programs based on what they know will work best for their students. Four finalist teams are in phase 2 of the project when they plan, execute, revise, and report on their programs. The project is expected to conclude in fall 2023.

In partnership with a private-sector organization, Dreams Soar, the Federal Aviation Administration (Department of Transportation), created a female Aviation STEM Ambassador for the FAA. The ambassador will be a role model for young women and girls who want to pursue aviation and STEM careers. The partnership allows the FAA to leverage Dreams Soar's platform and deliver resources of female empowerments through aviation at a scale beyond what the FAA could do on its own.

To improve the employment opportunities for Veterans, the VA established the VET TEC Employer Consortium in FY2020. The goal of the consortium is to accelerate the hiring of VET TEC students who complete a tech-focused program of study. The Consortium connects students to employers with hiring opportunities and offers career resources to assist them with their vocational goals signed 12 memoranda of agreements with industry employers.

In 2020, NASA established a partnership with Discovery Education to expand digital access to STEM resources and opportunities. Collaborative programming included interactions with NASA scientists and engineers and development of playlists that leverage high-profile missions to teach classroom topics.

Agencies used agreement mechanisms including, memoranda of understanding (MOUs), cooperative agreements, grants, gifts, inter-agency agreements, contracts, informal agreements, and educational partnerships.

### **STEM Education Advisory Panel**

The role of the STEM Education Advisory Panel is to provide advice and recommendations to CoSTEM, assess CoSTEM's progress in carrying out responsibilities related to the America COMPETES Reauthorization Act, and help identify need or opportunity to update the Federal STEM Education Strategic Plan. Members met in December 2020 to assess CoSTEM's progress in fulfilling the Strategic Plan. At the December 2020 meeting, after receiving updates from FC-STEM and IWG representatives, panel members discussed whether there was evidence of action in meeting the COMPETES Act requirements and if there was evidence of action towards the pathways and objectives of the Strategic Plan. Members of the public can find more information about the meeting and its minutes on the panel website<sup>7</sup>.

### **Closing Summary**

STEM priorities as detailed in the 2018 Federal STEM Education Strategic Plan were released following a White House State-Federal STEM Education Summit held earlier in the year.<sup>8</sup> The central objective of the strategic plan is to ensure lifelong access to high-quality STEM education for all Americans and to position the U.S. as the global leader in STEM literacy, innovation, and employment. To achieve this objective, the strategy identifies three overarching goals: build strong foundations for STEM literacy; increase diversity, equity and inclusion in STEM; and prepare the STEM workforce for the future. Supporting these goals are four pathways: develop and enrich strategic partnerships; engage students where disciplines converge; build computational literacy; and operate with transparency and accountability. These pathways are further supported by 3-5 objectives for improving STEM education and assessing this improvement. Progress reports released in 2019<sup>9</sup> and 2020<sup>10</sup> summarize efforts made to achieve the strategic objective, including an inventory of Federal programs, their budgets and their alignment with the goals and pathways. This annual progress report captures activities up until February 2021 with the exception of the information in the Appendix. Information collected after February 2021 was necessary to ensure the report fulfills American COMPETES Reauthorization Act<sup>11</sup> requirements. As such, the appendix also begins to reflect the priorities of a new Administration.

---

<sup>7</sup> <https://nsf.gov/ehr/STEMEdAdvisory.jsp>

<sup>8</sup> <https://trumpwhitehouse.archives.gov/wp-content/uploads/2018/06/Summary-of-the-2018-White-House-State-Federal-STEM-Education-Summit.pdf>

<sup>9</sup> <https://trumpwhitehouse.archives.gov/wp-content/uploads/2019/10/Progress-Report-on-the-Federal-Implementation-of-the-STEM-Education-Strategic-Plan.pdf>

<sup>10</sup> <https://trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/Progress-Report-Federal-Implementation-STEM-Education-Strategic-Plan-Dec-2020.pdf>

<sup>11</sup> [PUBL358.PS \(congress.gov\)](https://www.congress.gov/bills/116/358)

## Appendix 1. Agency STEM Education Implementation Actions Alignment to Pathways and Objectives (Version: 12.04.2018)

GOALS FOR AMERICAN STEM EDUCATION																
★ Build Strong Foundations for STEM Literacy ★																
★ Increase Diversity, Equity, and Inclusion in STEM ★																
★ Prepare the STEM Workforce for the Future ★																
Pathways	Objectives	DOC	DOD	DOE	DOI	DOL	DOS	DOT	ED	EPA	HHS	NASA	NSF	SI	USDA	
Develop and Enrich Strategic Partnerships	Foster STEM Ecosystems that Unite Communities	●	●	●	●		●	●	●	●	●	●	●	●	●	
	Increase Work-Based Learning and Training through Educator-Employer Partnerships	●	●	●	●	●		●	●	●	●	●	●	●	●	
	Blend Successful Practices from Across the Learning Landscape	●	●	●			●	●	●				●	●	●	
Engage Students where Disciplines Converge	Advance Innovation and Entrepreneurship Education	●	●	●			●	●	●	●	●		●		●	
	Make Mathematics a Magnet	●	●	●					●				●		●	
	Encourage Transdisciplinary Learning	●	●	●	●			●	●	●	●	●	●	●	●	
Build Computational Literacy	Promote Digital Literacy and Cyber Safety	●	●				●		●		●		●		●	
	Make Computational Thinking an Integral Element of All Education	●	●	●	●				●		●		●	●	●	
	Expand Digital Platforms for Teaching and Learning	●		●					●	●			●	●	●	
Operate with Transparency and Accountability	Leverage and Scale Evidence-Based Practices Across STEM Communities															
	Report Participation Rates of Underrepresented Groups															
	Use Common Metrics to Measure Progress															
	Make Program Performance and Outcomes Publicly Available															
	Develop a Federal Implementation Plan and Track Progress															

## Appendix 2. Definition of a STEM Education Investment (Version: 03.06.2019)

**STEM:** For the purposes of this inventory, STEM includes physical and natural sciences, technology, engineering, mathematics, and computer science disciplines, topics, or issues (including environmental science, environmental stewardship, and cybersecurity). We recognize that various different and usually broader definitions are used for “STEM.” This relatively narrow definition has been chosen to constrain the focus of the inventory to specific areas that have similar educational contexts, issues, and challenges, in order to maximize the inventory’s usefulness in characterizing and improving the effectiveness of the Federal spending intended to address this particular set of educational contexts, issues, and challenges.

**Investment (the unit of analysis in the detailed survey):** A funded STEM education activity that has a dedicated budget of more than \$300,000 in FY 2018 and staff to manage the budget. This budget may be part of a budget for a larger program. Federal salaries and expenses and activities that are one-time or irregular expenditure of overhead funds are excluded.

**STEM Education:** Formal or informal (in school or out) education that is primarily focused on STEM disciplines, topics, or issues, as defined above. All the investments included in this STEM education inventory have one of the following as a **primary objective**:

- **Learning:** Develop STEM skills, practices, or knowledge of students or the public.
- **Engagement:** Increase learners’ interest in STEM, their perception of its value to their lives, and/or their ability to participate in STEM.
- **Pre- and In-Service Educator/Education Leader Performance:** Train or retain STEM educators (K-12 pre-service or in-service, postsecondary, and informal) and education leaders to improve their content knowledge and pedagogical skills.
- **Postsecondary STEM Degrees:** Increase the number of students who enroll in STEM majors, complete STEM credentials or degree programs, or are prepared to enter STEM careers or advanced education.
- **STEM Careers:** Prepare people to enter into or advance in the STEM workforce with training or certification (where STEM discipline specific knowledge and skill are the primary focus of the education investment).
- **STEM System Reform:** Improve STEM education through a focus on education system reform.
- **Institutional Capacity:** Support advancement and development of STEM personnel, programs, and infrastructure in educational institutions such as universities, informal education institutions, state education agencies, and local education agencies.
- **Education Research and Development:** Develop evidence-based STEM education models and practices.

For the purposes of this inventory, activities that have the following **primary objectives** are **not** considered to be a STEM education investment:

- Providing post-doctoral research fellowships/scholarships.
- Focusing on subjects other than STEM subjects or including STEM subjects as one of many possible focal subjects (more than two other non-STEM areas).\*
- Focusing on broad education system reform that encompasses far more than STEM education.
- Supporting one-time or ad hoc STEM education investments.

- Engaging in volunteer activities by Federal employees (e.g. judging STEM competitions, visiting classrooms).
- Providing outreach for education (raising awareness of education programs) or communication about an agency and its activities.
- Distributing STEM education products that are no longer part of a funded education investment.
- Supporting knowledge, interest, or skills not specific to STEM disciplines.

\* The Department of Education is excluded from this provision, in order to include the Department of Education's contributions to the federal STEM education portfolio that are funded via investments that may support education in STEM and non-STEM subject areas.

### Appendix 3. Agency STEM Education Investments (FY2020) Alignment to Goals and Pathways

The information in the table below shares how each individual agency's investment aligns with the goals and pathways identified in the Strategic Plan. This information was collected by FC-STEM. FC-STEM agencies were asked how investments aligned to the Federal STEM Education Strategic Plan goals and pathways. A "D" indicates that the major outcome of the STEM investment contributes directly to, or progress towards the attainment of the goal or pathway. An "I" indicates that the major outcome of the STEM investment contributes indirectly to the attainment of the goal or pathway, or the investment outcome supports the goal or pathway or progress towards the goal, but is not a stated goal or objective of the investment. A blank indicates that the anticipated outcomes of the investment are unlikely to contribute, directly or indirectly, to achieve the goal or pathway.

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
CNCS/ AmeriCo rps		CNCS STEM Programs	D	D	D	I	D	D
DOC	EDA	STEM Talent Challenge	D	D	D	D	I	D
DOC	NIST	STEM Pipeline for the Next Generation Scientists and Engineers	D	D	D	D	D	I
DOC	NIST	Summer Middle School Institute	D	I	D	D	D	D
DOC	NIST	Summer Undergraduate Research Fellowship (SURF) Program	D		D	D		
DOC	NOAA	Bay Watershed Education and Training (B-WET)	D	I	I	D	D	
DOC	NOAA	Dr. Nancy Foster Scholarship Program		I	I	I	I	
DOC	NOAA	Ernest F. Hollings Scholarship Program	I	I	D	I		
DOC	NOAA	Jose E. Serrano Educational Partnership Program with Minority Serving Institutions	I	D	D	D		D
DOC	NOAA	NOAA Environmental Literacy Program (ELP)	D	I	I	I	D	I
DOC	NOAA	Margaret A. Davidson Graduate Fellowship	I	I	D	D	D	



Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
DOC	NOAA	NOAA Teacher at Sea Program	I	I	I	I	I	
DOC	NOAA	Office of Ocean Exploration Education Programs	D	D	D	D	I	I
DOC	NOAA	Sea Grant	D	I	D	I	D	
DOD	AFRL	Air Force STEM/Legacy Program	D	I	D	I	I	I
DOD	DTRA	Joint Science and Technology Institute (JSTI)	D	I	I	I	I	I
DOD	MDA	MDA - Inspiring Generations with New Ideas to Transform Education (IGNITE)	I	D	I	D	D	D
DOD	NSA	Centers of Academic Excellence	D	I	D	D	D	D
DOD	NSA	GenCyber Program	D	D	D	D	D	D
DOD	NSA	NSA Cyber Exercise	D	I	D	I	I	I
DOD	ODASA (R&T)	Army Educational Outreach Program (AEOP)	D	D	D	D	D	D
DOD	ONR	Navy - Science and Engineering Apprenticeship Program (SEAP)	I	I	I		I	I
DOD	ONR	The Naval Research Enterprise Intern Program (NREIP)	I	I	I		I	I
DOD	OUSD (R&E)	National Defense Education Program (NDEP) STEM Education and Outreach	D	D	D	D	I	I
DOD	OUSD (R&E)	National Defense Education Program (NDEP) Science, Mathematics And Research for Transformation (SMART)	I	D	D	D	I	I
DOD	OUSD (R&E)	National Defense Science and Engineering Graduate (NDSEG) Fellowship Program	I	I	D	I	I	I

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
DOD	P&R, M&RA	DoD STARBASE Program	D	D	D	D	D	D
DOE	ED	Minority Educational Institution Student Partnership Program	I	D	D	D		
DOE	EERE	Advanced Manufacturing Consortia	I	D	D	D		
DOE	EERE	Advanced Vehicle Competitions	D	I	D	D	D	I
DOE	EERE	Algae Technology Educational Consortium	D	I	I	I	D	I
DOE	EERE	Buildings Workforce Development Activities	D	D	D	D	I	I
DOE	EERE	Collegiate Wind Competition	D	D	D	D	D	D
DOE	EERE	FEMP Online Training Program	D	I	D	I	I	D
DOE	EERE	Frontier Observatory for Research in Geothermal Energy (FORGE)	D	I	D		D	
DOE	EERE	Graduate Student Fellowships	D	D	D	I	D	I
DOE	EERE	H2 & FC STEM and Workforce Training	I	I	I	I	I	I
DOE	EERE	Industrial Assessment Centers	D	I	D	D	I	D
DOE	EERE	Land Grant University Graduate Education FOA	D	I	D	I	D	I
DOE	EERE	Manufacturing Demonstration Facility	I	I	I	D	I	D
DOE	EERE	Marine Energy Collegiate Competition	D	D	D	D	D	I
DOE	EERE	Solar Decathlon	I	D	D	D	I	D

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
DOE	EERE	Water Power STEM/Workforce (e.g. Incubators)	D	D	D	D	I	
DOE	EERE	Wide Bandgap Power Electronics Traineeship	D	I	D	D		D
DOE	EERE	Wind for Schools	D	D	D	D	I	D
DOE	EERE	Workforce FOA	I	D	D	D	I	D
DOE	EM	Minority Serving Institution Partnership Program (MSIPP)	D	D	D	D	I	I
DOE	FE	Special Recruitment Programs/Mickey Leland Fellowship	I	D	D	D	I	
DOE	NE	Integrated University Program		I	D	I	I	
DOE	NNSA	Minority Serving Institution Partnership Program (MSIPP)	I	D	D	D	D	I
DOE	NNSA	Stewardship Science Academic Alliances (SSAA) Grants and Cooperative Agreements	I	I	D	D	D	I
DOE	SC	Community College Internship	I	D	D	I	D	I
DOE	SC	National Science Bowl	D	I	I	I	D	I
DOE	SC	Nuclear Chemistry Summer School (NCSS)	I	I	D	D	D	
DOE	SC	Office of Science Graduate Student Research Program	I	I	D	I	D	I
DOE	SC	Science Undergraduate Laboratory Internships	I	I	D	I	D	I
DOE	SC	U.S. Particle Accelerator Training	I	I	D	D	D	I
DOE	SC	Visiting Faculty Program	I	D	D	I	D	I

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
DOE	SC/ASCR and NNSA	Computational Science Graduate Fellowship (CSGF)	I	I	D	D	D	I
DOI	USGS	EdMap	D		D		I	I
DOL	ETA	H-1B Skills Training Grants	I	I	I	I		I
DOT	FAA	Air Transportation Centers of Excellence	D	D	D	D	D	D
DOT	FHWA	Dwight David Eisenhower Transportation Fellowship Program	D	D	D	D	D	D
DOT	FHWA	National Summer Transportation Institute Program	D	D	D	D	D	D
DOT	FHWA	Summer Transportation Institute Program for Diverse Groups	D	D	D	D	D	D
DOT	OAS(R&T)	University Transportation Centers Program	D	D	D	D	D	D
ED	FSA	Teacher Loan Forgiveness		I			I	
ED	IES	Research Education Laboratories (REL)	I	I	I	I	I	I
ED	IES	Research in Special Education (RISE)	I	I	I	I	I	I
ED	IES	Research, Development, and Dissemination (RDD)	I	I	I	I	I	I
ED	OESE	21st Century Community Learning Centers	D	D	D	D	D	D
ED	OESE	Investing in Innovation (now called Education Innovation and Research (EIR)	I	I	I	I	I	I
ED	OPE	Developing Hispanic Serving Institutions STEM and articulation programs	D	D	D	I	I	I

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
ED	OPE	Graduate Assistance in Areas of National Need (GAANN)	I	I	D	I	I	I
ED	OPE	Minority Science and Engineering Improvement Program	D	D	D	I	I	I
ED	OPE	Strengthening Predominantly Black Institutions	I	I	I	I	I	I
ED	OPE	Upward Bound Math and Science Program	I	I	I	I	I	I
EPA	ORD	P3 - People, Prosperity & the Planet	D	D	D	D	D	D
HHS	NIH	Aging Research Dissertation Awards to Increase Diversity		D	D			
HHS	NIH	Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences		D	D	D		
HHS	NIH	Bridges to the Baccalaureate Program		D	D			
HHS	NIH	Bridges to the Doctorate		D	D			
HHS	NIH	Cancer Education Grants Program		I	D			
HHS	NIH	Center for Cancer Research Cancer Interns		D	D			
HHS	NIH	Center for Cancer Research Cancer/ John Hopkins University Master of Science in Biotechnology Concentration in Molecular Targets and Drug Discovery Technologies	D		D		I	I

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
HHS	NIH	Courses for Skills Development in Biomedical Big Data Science	I	I	D		I	D
HHS	NIH	Diversity Research Education Grants in Neuroscience		D	D	D		
HHS	NIH	Drug Abuse Dissertation Research		D	D			
HHS	NIH	Graduate Program Partnerships			D	I		
HHS	NIH	Initiative for Maximizing Research Education in Genomics; Diversity Action Plan		D	D			
HHS	NIH	Initiative for Maximizing Student Development		D	D			
HHS	NIH	MARC U-STAR NRSA Program		D	D			
HHS	NIH	Medical Research Scholars Program	I	I	D	I		
HHS	NIH	National Institute of Diabetes and Digestive and Kidney Diseases Research, Education Program Grants for Summer Research Experiences (R25)		I	D			
HHS	NIH	National Institute on Aging Medicine, Science, Technology, Engineering and Mathematics: Advancing Diversity in Aging Research (ADAR) through Undergraduate Education		D	D			

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
HHS	NIH	National Library of Medicine Institutional Training Grants for Research Training in Biomedical Informatics and Data Science		D	D			D
HHS	NIH	NCI Predoctoral to Postdoctoral Fellow Transition Award (F99 Portion Only)		I	D		I	
HHS	NIH	NCI Youth Enjoy Science (YES) Research Education Grant (R25)	I	D	D	I	D	D
HHS	NIH	NIH Big Data to Knowledge (BD2K) Enhancing Diversity in Biomedical Data Science		D	D			D
HHS	NIH	NIH Building Infrastructure Leading to Diversity (BUILD) Initiative (RL5 portion only)		D	D			
HHS	NIH	NIH Building Infrastructure Leading to Diversity (BUILD) Initiative (TL4 portion only)		D	D			
HHS	NIH	NIMHD Minority Health and Health Disparities International Research Training (T37)		D				
HHS	NIH	Post-baccalaureate Intramural Research Training Award Program	I	I	D			
HHS	NIH	Postbaccalaureate Research Education Program (PREP)		D	D			
HHS	NIH	Research Supplements to Promote Diversity in Health-Related Research		D	D			

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
HHS	NIH	Ruth L. Kirschstein National Research Service Award Institutional Research Training Grants (T32, T35)		I	D		I	
HHS	NIH	Ruth L. Kirschstein NRSA for Individual Predoctoral Fellows, including Underrepresented Racial/Ethnic Groups, Students from Disadvantaged Backgrounds, and Predoctoral Students with Disabilities		D	D			
HHS	NIH	Science Education Partnership Award	D	D	D	D	D	D
HHS	NIH	Short Courses in Population Research (Education Programs for Population Research R25)	I	I	I		I	I
HHS	NIH	Short-Term Research Education Program to Increase Diversity in Health-Related Research	D	D	D		I	
HHS	NIH	Short-Term Research Experience for Underrepresented Persons (STEP-UP; R25)	D	D	D	I	I	I
HHS	NIH	Student Intramural Research Training Award Program	I	I	D			
HHS	NIH	Summer Institute for Training in Biostatistics	D	I	D		I	I



Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
HHS	NIH	Team-Based Design in Biomedical Engineering Education		I	D		D	D
HHS	NIH	Training in Computational Neuroscience: From Biology to Model and Back Again (R90 portion only)		I	D			D
HHS	NIH	Undergraduate Research Education Program (UP) to Enhance Diversity in Environmental Health Sciences	I	D	D	I	I	I
HHS	NIH	Undergraduate Scholarship Program for Individuals from Disadvantaged Backgrounds	I	I	D			
HHS	NIH	Werner H Kirsten Student Internship Program		I	D	I	D	D
NASA	OSTEM	Minority University Research and Education Project (MUREP)	I	D	D	I	D	
NASA	OSTEM	National Space Grant College and Fellowship Project (Space Grant)	D	I	D	D	D	
NASA	OSTEM	Next Gen STEM	I	I	D	D	I	I
NASA	SMD	GLOBE	D	I	D	D	I	I
NASA	SMD	Science Activation	I	I	I	D	D	I
NRC	RES	Integrated University Program		I	I			
NSF	CISE/IIS	Harnessing the Data Revolution (HDR): Data Science Corps (DSC)	D	D	D	I	D	D
NSF	CISE/OAC	Training-based Workforce Development for Advanced Cyberinfrastructure (Cybertraining)	D	I	D	D	D	D

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
NSF	EHR	Advancing Informal STEM Learning (AISL)	I	D	I	D		I
NSF	EHR	Alliances for Graduate Education and the Professoriate (AGEP)		D	D	D	I	
NSF	EHR	Computer Science for All (CSforAll)	I	D	D	D		I
NSF	EHR	Cybercorps: Scholarship for Service (SFS)	I	D	D	D	D	D
NSF	EHR	Discovery Research PreK-12 (DR-K12)	I	D	D	I	D	D
NSF	EHR	EHR Core Research (ECR)	D	D	D	I	I	I
NSF	EHR	Excellence Awards in Science and Engineering (EASE)	I	I	D	I	I	I
NSF	EHR	Graduate Research Fellowship Program (GRFP)		D	D		D	D
NSF	EHR	Hispanic-Serving Institutions (HSI)	D	D	D	D	I	I
NSF	EHR	Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)	I	D	D	I	I	I
NSF	EHR	Improving Undergraduate STEM Education (IUSE)	D	D	D	I	D	I
NSF	EHR	Innovative Technology Experiences for Students and Teachers (ITEST)	I	D	D	D	D	D
NSF	EHR	Louis Stokes Alliances for Minority Participation (LSAMP)	D	D	D	D	I	I
NSF	EHR	NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES)		D	D	D		I

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
NSF	EHR	NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)	D	D	D	I	I	D
NSF	EHR	Robert Noyce Scholarship (Noyce) Program	D	D	D	I	D	D
NSF	EHR	Tribal Colleges and Universities Program (TCUP)	I	D	D	I	D	I
NSF	ENG	Emerging Frontiers in Research and Innovation (EFRI) Research Experience and Mentoring (REM)	D	D	D	I	D	D
NSF	ENG/EEC	Research Experiences for Teachers (RET) in Engineering and Computer Science	D	D	D	I	I	D
NSF	IES	International Research Experiences for Students (IRES)	I	D	D	I	I	I
SI	OUS(ED)	STEM Informal and Formal Education and Instruction	D	D	D	D	D	D
USDA	NIFA	1890 Facilities Grant Program	D	D	D	D	D	I
USDA		1890 Institutions Capacity Building Grants Program: Extension	I	I	I	I	I	I
USDA		1890 Institutions Capacity Building Grants Program: Teaching	D	D	D	D	D	I
USDA	OPPE	1890 Scholarships Program	D	D	D	D	D	D
USDA	NIFA	4-H Science, 4-H Youth Development Program	D	D	I	I	D	I
USDA		Agriculture in the Classroom	D	D	D	D	D	I

Agency	Sub-Agency/ Office	Program Name	Goal: Build strong foundat ions for STEM literacy	Goal: Increase diversity, equity and inclusion in STEM	Goal: Prepare the STEM work- force for the future	Path- way: Develop and enrich stra- tegic partner ships	Path- way: Engage students where discip- lines converge	Path- way: Build comput ational literacy
USDA		Hispanic serving Institutions Education Grants Program	D	D	D	D	D	I
USDA		Insular Programs	D	D	D	D	D	I
USDA		Multicultural Scholars, Graduate Fellowship and Institution Challenge Grants	D	D	D	D	D	I
USDA		NIFA Fellowship Grants Program	D	D	D	D	D	I
USDA		Secondary Postsecondary Agriculture Education Challenge Grants (SPECA)	D	D	D	D	D	I
USDA		Women and Minorities in Science, Technology, Engineering and Mathematics Fields Program (WAMS)	D	D	D	D	D	I
VA	VBA	Edith Nourse Rogers STEM Scholarship		I	D	I	I	I
VA		Veteran Employment Through Technology Education Courses (VET TEC)		I	D	D	I	D

## Appendix 4. Profile of FY2020 STEM Education Investments

The America COMPETES Reauthorization Act of 2010 called for the creation of a National Science and Technology Council (NSTC) Committee to inventory Federal STEM education programs and create a five-year STEM education strategic plan. The NSTC Committee on STEM Education (CoSTEM) was created ten years ago in 2011 to carry out these tasks. Agencies have different definitions of “programs,” “projects,” and “activities.” However, the development of the definition of a STEM education “investment” was to help provide a common unit of analysis (See Appendix 2). Below, from over 170 agency investments, the report reflects the FY2020 STEM Education Profile based off of this year’s data collection.

The data request asked agencies to identify their investments’ primary objective(s). The eight objectives can be found in Appendix 2. Fifty-eight percent (58%) of Federal STEM education investments reported learning (developing STEM skills, practices, or knowledge of students or the public) as one of their primary objectives. Fifty-one, fifty, and forty-nine percent of Federal investments reported STEM career training, engagement, and postsecondary STEM degree as one of their primary objectives, respectively. Less than thirteen percent of investments reported improving pre- and in-Service Educator/Education Leader Performance as a primary objective. Less than four percent of investments listed STEM system reform as a primary objective. Less than fifteen percent had education research and development as one of their primary objectives.

STEM education investments tend to cover a range of fields – either covering a range of STEM disciplinary/transdisciplinary areas or covering multiple areas of STEM as seen in Figure 1. STEM education initiatives were often designed for many different audiences and often addressed the needs of multiple audiences. The data collection reflects that the most frequently served audience in FY2020 Federal STEM Education investments were postsecondary learners as seen in Figure 2.

Federal science agencies reported information on over 170 ongoing STEM education investments. Of the investments that ask participants to self-report on some form of demographic information (race/ethnicity, gender, locality/rural status, disability, etc.), forty-one investments were able to share a portion of this data. Of these, twenty-one of the investments collected self-reported data on race/ethnicity, twenty-one investments on gender, and six on participant rural or urban status. Of the investments that did not report collecting demographic data, 18 plan to do so in the future.

Agencies also shared how they assess the impact of their STEM education investments. Mechanisms for data collection varied greatly across investments. These included annual program assessments, focus groups, pre- and post-surveys, interviews, artifacts, expert input, portfolio analysis, longitudinal tracking and assessment, data analysis, qualitative analysis, research studies, participant listening sessions, third party evaluations, etc. While investments often conduct annual or ongoing periodic forms of assessment, formal/external evaluations did not occur at the same cadence. At least fifty investments have had some form of formal/external evaluation and twenty-eight had evaluations in progress at the time of the data request. Recently released public reports include: NASA Science

Activation Program<sup>12</sup>, NSF INCLUDES Special Report to the Nation II<sup>13</sup>, DoD ARMY Educational Outreach Program<sup>14</sup>, and USGS EDMAP Program<sup>15</sup>.

Based on a comparison the FY2020 STEM education investments, agencies and their investments focused on different primary objectives, audiences, and STEM fields, and did not appear to be duplicative.

---

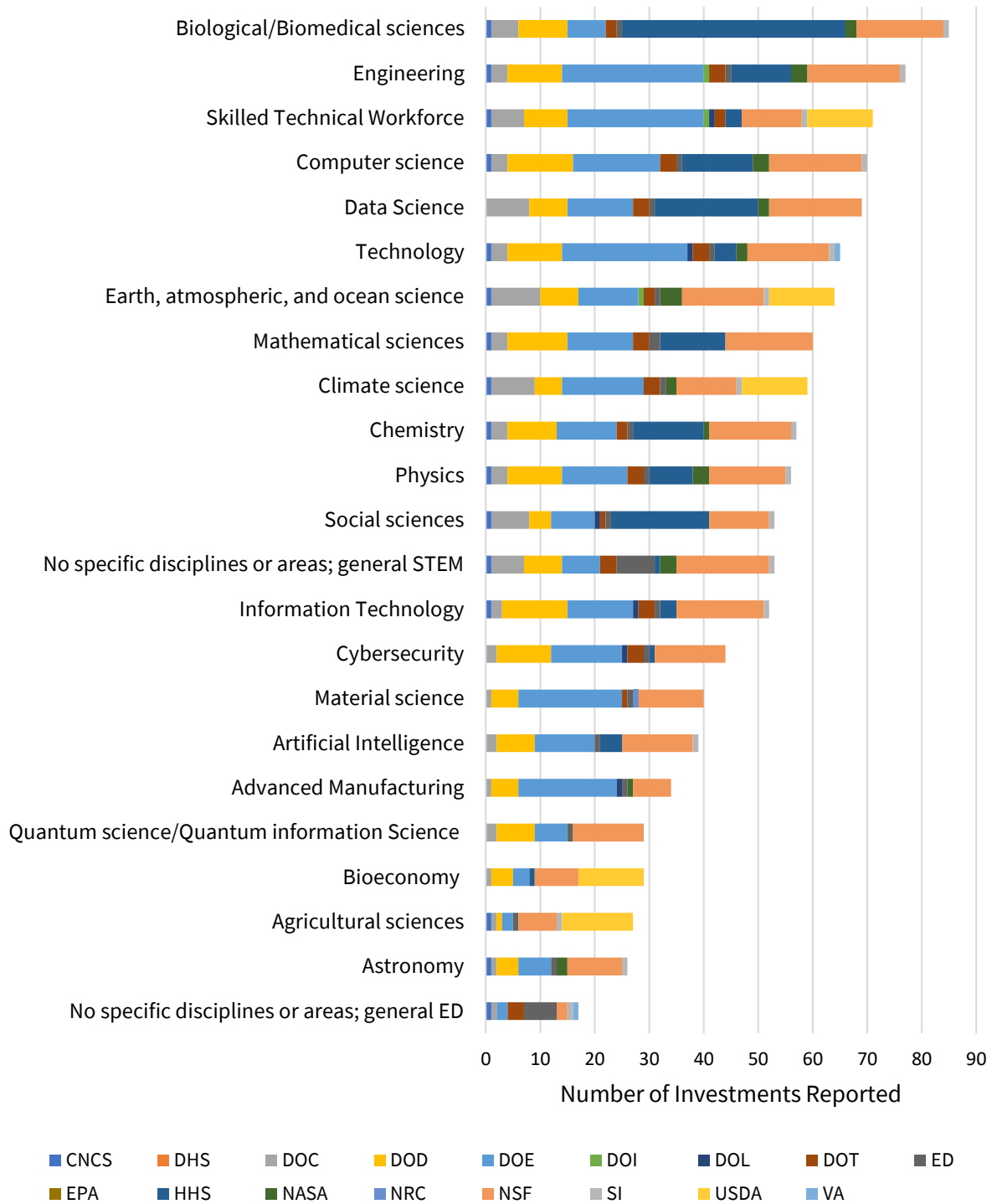
<sup>12</sup> <https://www.nap.edu/catalog/25569/nasas-science-activation-program-achievements-and-opportunities>

<sup>13</sup> <https://www.nsf.gov/pubs/2020/nsf20099/nsf20099.pdf>

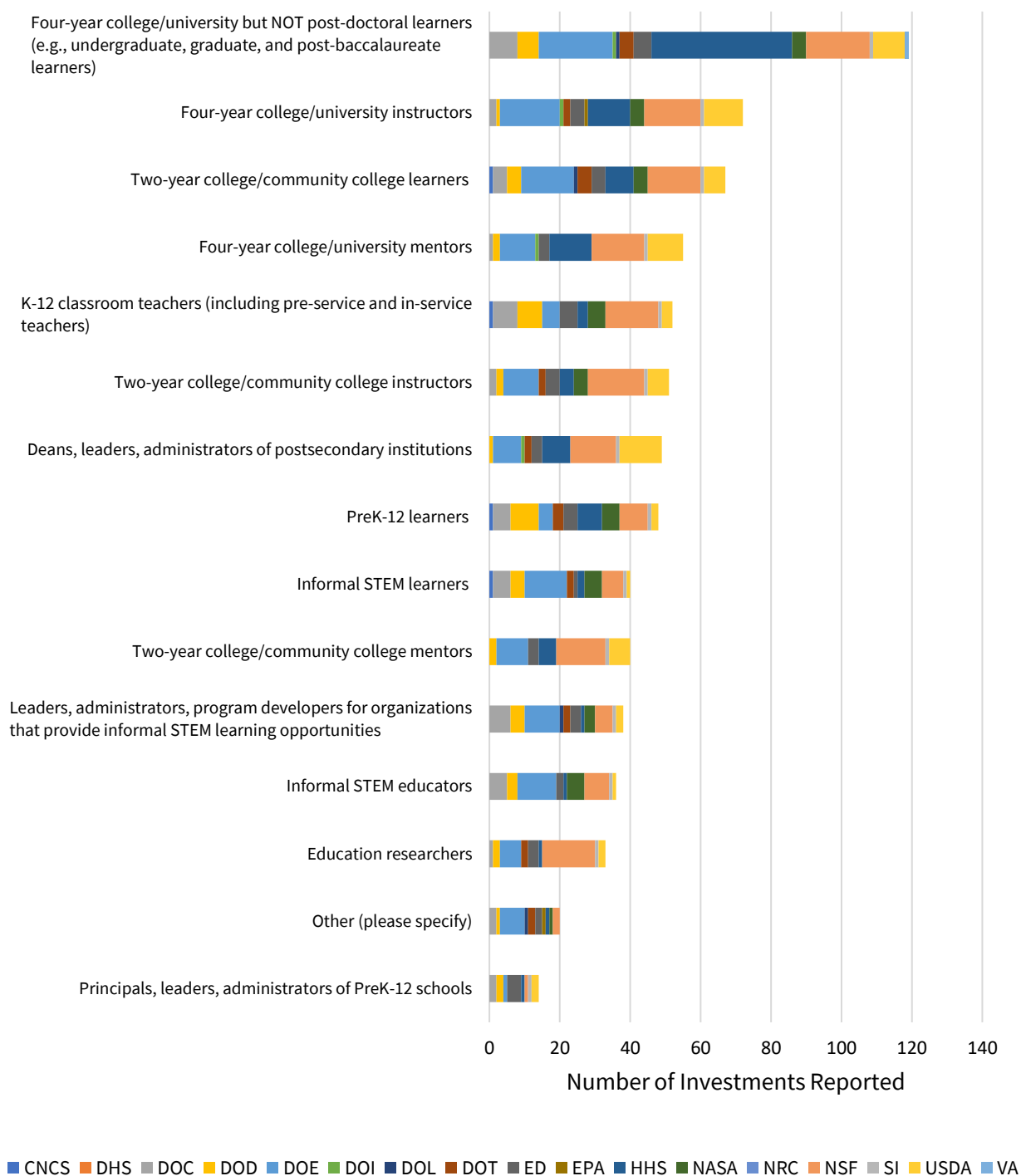
<sup>14</sup> <https://www.usaeop.com/wp-content/uploads/2020/12/Part-1-FY19-AEOP-Summative-Report-Executive-Summary-Dec-2020.pdf>

<sup>15</sup> <https://pubs.er.usgs.gov/publication/fs20193059>

**Figure 1. FY2020 Federal Investments by Disciplinary/Transdisciplinary Area**



## Figure 2. FY2020 Federal Investments by Audience Served





## Appendix 5. FY 2021–Enacted Inventory of STEM Education Investments

Below is a list of STEM education investments and funding levels provided by OMB's 2021 data call on Federal STEM education programs. Programs were included if they had any funding in FY 2020 or FY 2021.

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
CNCS		AmeriCorps NCCC	0.2	0.2	0.2
CNCS		AmeriCorps State & National (Competitive)	66.7	66.7	66.7
CNCS		AmeriCorps State (Formula)	18.7	18.7	18.7
CNCS		AmeriCorps VISTA	3.6	3.6	3.6
DHS	CWMD	National Nuclear Forensics Expertise Development Program	2.6	2.6	3.5
DHS	S&T	Educational Programs - Minority Serving Institutions	3.4	5.2	5.2
DOC	EDA	STEM Apprenticeship Pilot Program	0	4	10
DOC	NIST	NIST Summer Institute for Middle School Teachers	0.1	0.3	0.3
DOC	NIST	STEM Pipeline for the Next Generation Scientists and Engineers.	0.9	1	1
DOC	NIST	Summer Undergraduate Research Fellowship (SURF)	0.1	0.8	0.8
DOC	NOAA	Competitive Education Grants (including Environmental Literacy Grants)	2.8	2.7	5
DOC	NOAA	Dr. Nancy Foster Scholarship Program	0.6	0.6	0.9
DOC	NOAA	Educational Partnership Program with Minority Serving Institutions	17.2	20	23
DOC	NOAA	Ernest F. Hollings Undergraduate Scholarship Program	5.4	5.4	7
DOC	NOAA	Margaret A. Davidson Graduate Research Fellowship	1.6	1.7	1.8

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
DOC	NOAA	National Sea Grant College Program	1.3	1.5	1.7
DOC	NOAA	NOAA Bay Watershed Education and Training (B-WET)	7.8	7.8	7.8
DOC	NOAA	NOAA Teacher at Sea Program	0.6	0.6	0.6
DOC	NOAA	Office of Ocean Exploration Education Programs	1.3	0.8	0.5
DOD	AFRL	Air Force STEM	4.6	4.6	4.7
DOD	DTRA	Joint Science and Technology Institute	0	0.5	0
DOD	MDA	MDA - Inspiring Generations with New Ideas to Transform Education (IGNITE)	0.5	0.6	0.6
DOD	ODASA(R&T)	Army Educational Outreach Program (AEOP)	10.2	10.3	10.6
DOD	ONR	Navy - Science and Engineering Apprenticeship Program (SEAP)	0.1	0.6	0
DOD	ONR	The Naval Research Enterprise Intern Program (NREIP)	2.1	4.3	0
DOD	OUSD(R&E)	National Defense Education Program (NDEP) K-12 component	46.6	60.1	23.3
DOD	OUSD(R&E)	National Defense Education Program (NDEP) Military Child STEM Educational Programs	11.5	0	0
DOD	OUSD(R&E)	National Defense Education Program (NDEP) Science, Mathematics And Research for Transformation (SMART)	71	77	88.8

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
DOD	OUSD(R&E)	National Defense Science and Engineering Graduate (NDSEG) Fellowship Program	45	45	45
DOD	P&R, M&RA	DoD STARBASE Program1	35	41.2	0
DOE	CESER	CyberForce Competition	0.6	1.6	1.6
DOE	ED	Minority Educational Institution Student Partnership Program	0.7	1.5	1
DOE	EERE	Advanced Vehicle Competitions	3	2.5	2.5
DOE	EERE	Algae Technology Education Consortium	0	0.8	1.2
DOE	EERE	Collegiate Wind Competition	0	0.9	1.2
DOE	EERE	Geothermal Energy STEM Activities	0	4.5	3
DOE	EERE	Industrial Assessment Centers	12	12.5	12.5
DOE	EERE	Jump into STEM	0	1	1
DOE	EERE	Solar Decathlon	2	2	2.5
DOE	EERE	Solar District Cup	0	0.7	0.4
DOE	EERE	Water Power STEM Activities	0	2	3.2
DOE	EERE	Wind for Schools	1	1	0
DOE	EM	HBCU Mathematics, Science & Technology, Engineering and Research Workforce Development Program	6	0	0
DOE	EM	Minority Serving Institution Partnership Program (MSIPP)	0	6	6
DOE	EM	MSI STEM, Manufacturing and Cybersecurity Consortium	0	0	50
DOE	FE	Special Recruitment Programs/Mickey Leland Fellowship	0.7	0.7	0.7
DOE	IE	Alaska Resource Education (ARE) Energy Education and Outreach	0	0.6	0

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
DOE	NE	Integrated University Program	5	5	6
DOE	NNSA	Center of Excellence for Materials Degradation and Life Extension	0	6	0
DOE	NNSA	Computational Sciences Graduate Fellowship (CSGF)	2	2	2
DOE	NNSA	Joint Program in High Energy Density Laboratory Plasmas	8.5	8.7	8.9
DOE	NNSA	Minority Serving Institution Partnership Program (MSIPP)	25	35	35
DOE	NNSA	MSI Pit Production Workforce Development Partnership	0	7	10
DOE	NNSA	Nuclear Nonproliferation International Safeguards Graduate Fellowship Program	0.5	0.7	0.8
DOE	NNSA	Predictive Science Academic Alliance Program	20	20	20.5
DOE	NNSA	Rickover Fellowship Program in Nuclear Engineering	1	1.2	1.4
DOE	NNSA	Savannah River Site Community Reuse Organization Workforce Opportunities in Regional Careers Program	1.4	1.4	1.2
DOE	NNSA	Stewardship Science Academic Alliances (SSAA) Grants and Cooperative Agreements	26	26.2	24.3
DOE	NNSA	Tribal Education Partnership Program (TEPP)	5	5	5
DOE	SC	American Chemical Society Summer School in Nuclear and Radiochemistry	0.6	0.6	0.7

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
DOE	SC	Community College Internship (formerly Community College Institute of Science and Technology)	1.7	1.9	2
DOE	SC	Computational Sciences Graduate Fellowship	10	10	15
DOE	SC	Graduate Student Research Program	4.5	4.6	5
DOE	SC	Isotopes (IP) Traineeship	0	1	0
DOE	SC	National Science Bowl	2.9	2.9	2.9
DOE	SC	Reaching a New Energy Sciences Workforce (RENEW)	0	0	30
DOE	SC	Science Undergraduate Laboratory Internships	13.6	13.8	14
DOE	SC	U.S. Particle Accelerator Training	1	0.8	1
DOE	SC	Visiting Faculty Program (formerly Faculty and Student Teams)	2	1.8	2.1
DOI	USGS	EDMAP	0.5	0.9	1
DOL	ETA	H-1B Training Activities	40.4	76.5	60
DOT	FAA	Air Transportation Centers of Excellence	66.9	70.3	57.6
DOT	FHWA	Dwight David Eisenhower Transportation Fellowship Program	2.1	2	2
DOT	FHWA	Garrett A. Morgan Technology and Transportation Education Program	0	0.4	0.4
DOT	FHWA	National Summer Transportation Institute Program (NSTI)	2.7	2.7	2.7
DOT	FHWA	Summer Transportation Institute Program for Diverse Groups (STIPDG)	0.9	1.4	1.5
DOT	FHWA	University Transportation Centers Program	70.2	68.9	77.5

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
DOT	FRA	Encouraging Early Interest in Railroad Careers	0	0	0.3
DOT	FRA	Making Railroading a Career of Choice	0	0.4	0.4
DOT	FRA	Partnerships with Associations and Industry	0	0	0.4
ED	IES	Institute of Education Sciences - American Rescue Plan	0	0	5
ED	IES	Regional Educational Laboratories	3.1	1.7	1.3
ED	IES	Research in Special Education	13.8	18.1	14.7
ED	IES	Research, Development, and Dissemination	39.4	45.7	65.3
ED	OESE	21st Century Community Learning Centers	0	0	0
ED	OESE	Investing in Innovation	65	67	0
ED	OPE	Developing Hispanic Serving Institutions STEM and articulation programs	94.1	94.3	290.3
ED	OPE	Graduate Assistance in Areas of National Need (GAANN)	23.1	23.5	23.5
ED	OPE	Minority Science and Engineering Improvement Program	12.6	13.4	18.4
ED	OPE	Strengthening Predominantly Black Institutions	8.2	7.5	20
ED	OPE	Teacher Loan Forgiveness	100	105	108
ED	OPE	Upward Bound Math and Science Program	64.5	65.9	94.6
EPA	EE	Environmental Education Grants	3.3	3.3	3.3
EPA	EE	National Environmental Education and Training Partnership	2.1	2.1	2.1

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
EPA	ORD	P3-People, Prosperity & the Planet-Award: A National Student Design Competition for Sustainability	0.7	0.8	0.8
HHS	HRSA	Health Careers Opportunity Program	15	18.5	18.5
HHS	NIH	AD/ADRD Clinical Trials Short Course	0	0	1.8
HHS	NIH	Aging Research Dissertation Awards to Increase Diversity	0.7	0.8	0.8
HHS	NIH	Blueprint Program for Enhancing Neuroscience Diversity through Undergraduate Research Education Experiences	2.4	3.8	4
HHS	NIH	Bridges to the Baccalaureate Program	10.1	8.8	9.9
HHS	NIH	Bridges to the Doctorate	2.1	1.5	1.4
HHS	NIH	Cancer Education Grants Program	14.9	20.9	21.4
HHS	NIH	Cancer Research Training Award (CRTA) Program	6.6	7.5	7.9
HHS	NIH	Center for Cancer Research Cancer/John Hopkins University Master of Science in Biotechnology Concentration in Molecular Targets and Drug Discovery Technologies	0.4	0.4	0.4
HHS	NIH	Drug Abuse Dissertation Research	0.5	0.5	0.3
HHS	NIH	Enhancing Science, Technology, Engineering, and Math Educational Diversity (ESTEEMED) Research Education Experiences (R25)	1.5	0.8	0.8

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
HHS	NIH	Fogarty Global Health Training Program (US predoc component)	1.3	1	1
HHS	NIH	Graduate Program Partnerships	12.1	12.4	12.7
HHS	NIH	Health Careers Opportunity Program	0.8	0.9	0.2
HHS	NIH	Initiative for Maximizing Research Education in Genomics; Diversity Action Plan	3.1	3.4	2.9
HHS	NIH	Initiative for Maximizing Student Development	16.8	13.6	8.6
HHS	NIH	MARC U-STAR NRSA Program	18	17.1	18.9
HHS	NIH	Mathematics and Science Cognition and Learning (MSCL) Program	9.2	9.4	10
HHS	NIH	National Institute of Diabetes and Digestive and Kidney Diseases Research, Education Program Grants for Summer Research Experiences (R25)	3.1	3	3.2
HHS	NIH	National Institute of Neurological Disorders and Stroke Neuroscience Development for Advancing the Careers of a Diverse Research Workforce	3.8	3.5	4
HHS	NIH	National Institute on Aging Medicine, Science, Technology, Engineering and Mathematics: Advancing Diversity in Aging Research (ADAR) through Undergraduate Education	4.5	6.5	8.3



Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
HHS	NIH	National Library of Medicine Institutional Training Grants for Research Training in Biomedical Informatics and Data Science	11.8	11.5	12
HHS	NIH	NCI Predoctoral to Postdoctoral Fellow Transition Award (F99 Portion Only)	2	1.9	1.8
HHS	NIH	NIA Research and Entrepreneurial Development Immersion (REDI): Entrepreneurship Enhancement Award	0	0	0.8
HHS	NIH	NIDA Research Education Program for Clinical Researchers and Clinicians	5.2	5.2	5.8
HHS	NIH	NIH Big Data to Knowledge (BD2K) Enhancing Diversity in Biomedical Data Science	0.3	0.3	0.3
HHS	NIH	NIH Building Infrastructure Leading to Diversity (BUILD) Initiative (RL5 portion only)	8.9	7	5.9
HHS	NIH	NIH Building Infrastructure Leading to Diversity (BUILD) Initiative (TL4 portion only)	10.2	8	6.8
HHS	NIH	NIMHD Minority Health and Health Disparities International Research Training (T37)	3.3	3.2	3.5
HHS	NIH	Office of Intramural Training and Education (OITE)	0.3	0.3	0.3
HHS	NIH	Oxford-Cambridge Scholars Program (Ox/Cam)	0.2	0.3	0.3
HHS	NIH	P30 CURE Supplement	1	0	0

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
HHS	NIH	Post-baccalaureate Intramural Research Training Award Program	52.3	53.3	54.4
HHS	NIH	Postbaccalaureate Research Education Program (PREP)	12.7	13.6	14.1
HHS	NIH	Programs to Increase Diversity Among Individuals Engaged in Health-Related Research (PRIDE)	4.2	4.2	4.2
HHS	NIH	Providing Research Education Experiences to Enhance Diversity in the Next Generation of Substance Abuse and Addiction Scientists	2.4	2.4	2.4
HHS	NIH	Research Supplements to Promote Diversity in Health-Related Research	56	56	56
HHS	NIH	RISE (Research Initiative for Scientific Enhancement)	25.9	23.1	26.6
HHS	NIH	Ruth L. Kirschstein National Research Service Award Institutional Research Training Grants (T32, T35)	313.4	328.2	352
HHS	NIH	Ruth L. Kirschstein NRSA for Individual Predoctoral Fellows, including Underrepresented Racial/Ethnic Groups, Students from Disadvantaged Backgrounds, and Predoctoral Students with Disabilities	110.9	117.1	124.6
HHS	NIH	Science Education Partnership Award	21.1	22.2	23

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
HHS	NIH	Short Courses on Interdisciplinary Behavioral and Social Sciences Research on Aging	0	0	0.5
HHS	NIH	Short Courses on Interdisciplinary Behavioral and Social Sciences Research on Alzheimer's Disease and Related Dementias	0	0	0.5
HHS	NIH	Short Courses on Mathematical, Statistical, and Computational Tools for Studying Biological Systems	0.1	0.1	0.1
HHS	NIH	Short-Term Research Education Program to Increase Diversity in Health-Related Research	5.5	5.3	5.5
HHS	NIH	Short-Term Research Experience for Underrepresented Persons (STEP-UP; R25)	1.57	1.57	2.25
HHS	NIH	Strengthening Institutional Capacity to Conduct Global Cancer Research NCI D43	0	1.9	1.9
HHS	NIH	Student Intramural Research Training Award Program	0	5.5	5.7
HHS	NIH	Summer Institute for Training in Biostatistics	1.5	1.5	1.5
HHS	NIH	Summer Research Education Experience Programs	5.7	7.9	9.1
HHS	NIH	UMD-NCI Partnership for Integrative Cancer Research	0.8	0.8	0.9

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
HHS	NIH	Undergraduate Research Education Program (UP) to Enhance Diversity in Environmental Health Sciences	1	1	1
HHS	NIH	Undergraduate Scholarship Program for Individuals from Disadvantaged Backgrounds	4.3	4.3	0.1
HHS	NIH	Werner H Kirsten Student Internship Program	0	0.2	0.5
NASA	Office of STEM Engagement	MUREP	36	38	48
NASA	Office of STEM Engagement	NextGen STEM Project (NGS)	12	12	16
NASA	Office of STEM Engagement	Space Grant - National Space Grant College and Fellowship Program	48	51	57
NASA	SMD	GLOBE Program	6	6.9	6.9
NASA	SMD	SMD Robotics Alliance Program	4	4	4
NASA	SMD	SMD Science Activation Program	45.6	45.6	55.6
NRC	RES	Integrated University Program	2.5	18.4	0
NRC	SBCR	Minority Serving Institutions Program (MSIP)	0		
NSF	CISE	CyberTraining	5	6	6
NSF	CISE, EHR, MPS	Harnessing the Data Revolution (HDR): Data Science Corps (DSC)	3	6	3
NSF	EHR	Advanced Technological Education (ATE)	73.5	75	75
NSF	EHR	Advancing Informal STEM Learning (AISL), formerly Informal Science Education (ISE)	62.5	62.5	70

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
NSF	EHR	Alliances for Graduate Education and the Professoriate (AGEP)	8	8	8
NSF	EHR	Cybercorps: Scholarship for Service (SFS)	55	60	70
NSF	EHR	Discovery Research K-12 (DR-K12)	95	95	95
NSF	EHR	Excellence Awards in Science and Engineering (EASE)	7.3	5	7.7
NSF	EHR	Graduate Research Fellowship Program (GRFP)	284.5	284.5	318.5
NSF	EHR	Hispanic-Serving Institutions	45	46.5	56.5
NSF	EHR	Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)	35	36.5	46.5
NSF	EHR	Improving Undergraduate STEM Education	109.5	111.5	108.6
NSF	EHR	Innovative Technology Experiences for Students and Teachers (ITEST)	34.9	44.3	40.7
NSF	EHR	Louis Stokes Alliances for Minority Participation (LSAMP)	47.5	49.5	69.5
NSF	EHR	NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES)	20.8	20	46.5
NSF	EHR	NSF Research Traineeships (NRT)	49.6	58	58
NSF	EHR	NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)	79.9	132.8	121.9
NSF	EHR	Research Experiences for Undergraduates (REU)	98.6	82.3	84.5

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
NSF	EHR	Robert Noyce Scholarship (Noyce) Program	69.8	67	67
NSF	EHR	Tribal Colleges and Universities Program (TCUP)	15	16.5	21
NSF	EHR, CISE	Computer Science for All (CSforAll)	30.5	24.5	24.5
NSF	ENG	Emerging Frontiers in Research and Innovation (EFRI) Research Experience and Mentoring (REM)	0.5	0.8	1
NSF	ENG, CISE	Research Experiences for Teachers (RET) in Engineering and Computer Science	8.2	6.3	7.2
NSF	OISE	International Research Experiences for Students (IRES)	11.8	12.3	12
SI		STEM Informal Education and Instruction	5.2	5.7	6.1
USDA	APHIS	AgDiscovery	0.3	0.5	1
USDA	APHIS	Historically Black Colleges/Universities Vet Tech Programs	0.6	0.7	0.7
USDA	NIFA	1890 Facilities Grant Program	20.5	21.5	21.5
USDA	NIFA	1890 Institutions Capacity Building Grants Program: Extension	7.7	8.7	8.7
USDA	NIFA	1890 Institutions Capacity Building Grants Program: Teaching	7.7	8.7	8.7
USDA	OPPE	1890 National Scholars Program	5	10	10
USDA	NIFA	4-H Science, 4-H Youth Development Program	26.6	26.6	26.6
USDA	NIFA	Agriculture in the Classroom	0.6	0.6	1

Agency	Sub-Agency/Office	Program Name	FY 2020 Actual (\$, millions)	FY 2021 Estimated (\$, millions)	2022 President's Budget (\$, millions)
USDA	NIFA	Alaska Native-Serving and Native Hawaiian-Serving Institutions Education Competitive Grants Program	3.2	3.2	3.2
USDA	NIFA	Hispanic_serving Institutions Education Grants Program	11.2	12.5	12.5
USDA	NIFA	Insular Programs	2	2	2
USDA	NIFA	Multicultural Scholars, Graduate Fellowship and Institution Challenge Grants	9	9.5	9.5
USDA	NIFA	NIFA Fellowship Grants Program	32	58	70
USDA	NIFA	Secondary Postsecondary Agriculture Education Challenge Grants (SPECA)	0.9	0.9	0.9
USDA	NIFA	Women and Minorities in Science, Technology, Engineering and Mathematics Fields Program (WAMS)	0.4	0.4	1
VA		Edith Nourse Rogers STEM Scholarship	18.4	131.6	75
VA		Veteran Employment Through Technology Education Courses (VET TEC)	26.5	47.1	45

### FY 2021 STEM Education Investments Adjustments

Outside of the new programs that were initiated in FY2021, only one investment was terminated as its funding authority expired (National Defense Education Program (NDEP) Military Child STEM Educational Programs). Otherwise, changes from FY2020 to FY2021 investments included: Programs pivoting from in-person to virtual, changes in program offerings warranting inclusion or exclusion from the CoSTEM inventory, and/or changes in the amount of funds toward STEM-specific activities warranting inclusion or exclusion from the CoSTEM inventory.

## Appendix 6: Summary of STEM Education Investments

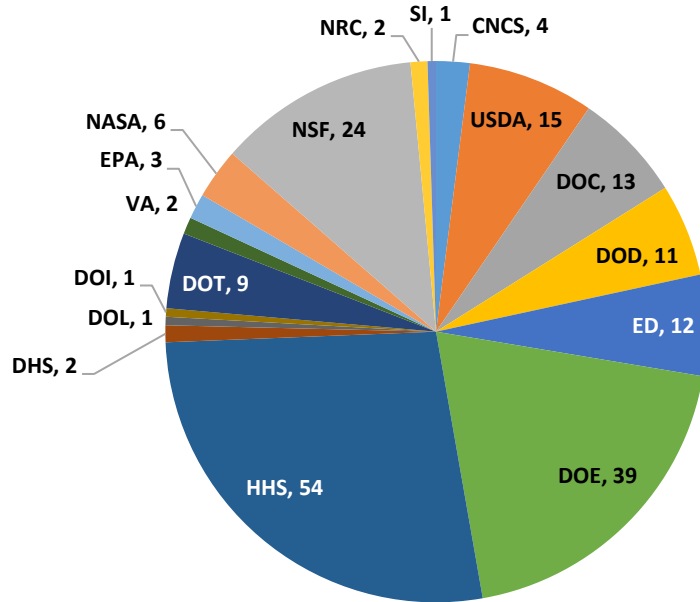
This table provides a summary of all inventory data from **Appendix 5** by agency.

Agency	FY20 Actual (\$, millions)	FY21 Estimated Budget (\$, millions)	2022 President's Budget (\$, millions)
Corporation for National and Community Service	89.2	89.2	89.2
Department of Agriculture	127.7	163.8	177.3
Department of Commerce	39.7	47.2	60.4
Department of Defense	226.6	244.2	173.0
Department of Education	423.8	442.1	641.1
Department of Energy	156.7	193.9	274.6
Department of Health and Human Services	789.5	822.2	861.4
Department of Homeland Security	6	7.8	8.7
Department of Labor	40.4	76.5	60
Department of the Interior	0.5	0.9	1.0
Department of Transportation	142.8	146.1	142.8
Department of Veterans Affairs	44.9	178.7	120
Environmental Protection Agency	6.1	6.2	6.2
National Aeronautics and Space Administration	151.6	157.5	187.5
National Science Foundation	1250.4	1310.8	1418.6
Nuclear Regulatory Commission	2.5	18.4	0
Smithsonian Institution	5.2	5.7	6.1
<b>Grand Total</b>	<b>3503.6</b>	<b>3911.2</b>	<b>4227.9</b>



**Figure 3.** This pie chart depicts the number of investments by agency for FY 2021 based on the inventory in **Appendix 5**.

FY 2021 Number of STEM Education Investments by Agency



**Figure 4.** This pie chart depicts the information provided in the table above in the FY2021 Estimated Budget column.

FY 2021 Estimated Budget (\$, millions)

